

Heathkit®

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HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

Kit orders and delivery information (616) 982-3411
Credit (616) 982-3561
Replacement Parts (616) 982-3571

Technical Assistance Phone Numbers

8:00 A.M. to 4:30 P.M., EST, Weekdays Only

Audio (616) 982-3310
Amateur Radio (616) 982-3296
Test Equipment, Weather Instruments and
Home Clocks (616) 982-3315
Television (616) 982-3307
Aircraft, Marine, Security, Scanners, Automotive,
Appliances and General Products (616) 982-3496
Computers — Hardware (616) 982-3309
Computers — Software:
Operating Systems, Languages, Utilities (616) 982-3860
Application Programs (616) 982-3884

YOUR HEATHKIT 90-DAY LIMITED WARRANTY

Consumer Protection Plan for Heathkit Consumer Products

Welcome to the Heath family. We believe you will enjoy assembling your kit and will be pleased with its performance. Please read this Consumer Protection Plan carefully. It is a "LIMITED WARRANTY" as defined in the U.S. Consumer Product Warranty and Federal Trade Commission Improvement Act. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Heath's Responsibility

PARTS — Replacements for factory defective parts will be supplied free for 90 days from date of purchase. Replacement parts are warranted for the remaining portion of the original warranty period. You can obtain warranty parts direct from Heath Company by writing or telephoning us at (616) 982-3571. And we will pay shipping charges to get those parts to you... anywhere in the world.

SERVICE LABOR — For a period of 90 days from the date of purchase, any malfunction caused by defective parts or error in design will be corrected at no charge to you. You must deliver the unit at your expense to the Heath factory, any Heath/Zenith Computers and Electronics center (units of Veritechnology Electronics Corporation), or any of our authorized overseas distributors.

TECHNICAL CONSULTATION — You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

NOT COVERED — The correction of assembly errors, adjustments, calibration, and damage due to misuse, abuse, or negligence are not covered by the warranty. Use of corrosive solder and/or the unauthorized modification of the product or of any furnished component will void this warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use, customer assembly, set-up time, or unauthorized service.

This warranty covers only Heath products and is not extended to other equipment or components that a customer uses in conjunction with our products.

SUCH REPAIR AND REPLACEMENT SHALL BE THE SOLE REMEDY OF THE CUSTOMER AND THERE SHALL BE NO LIABILITY ON THE PART OF HEATH FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORESEEABLE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Owner's Responsibility

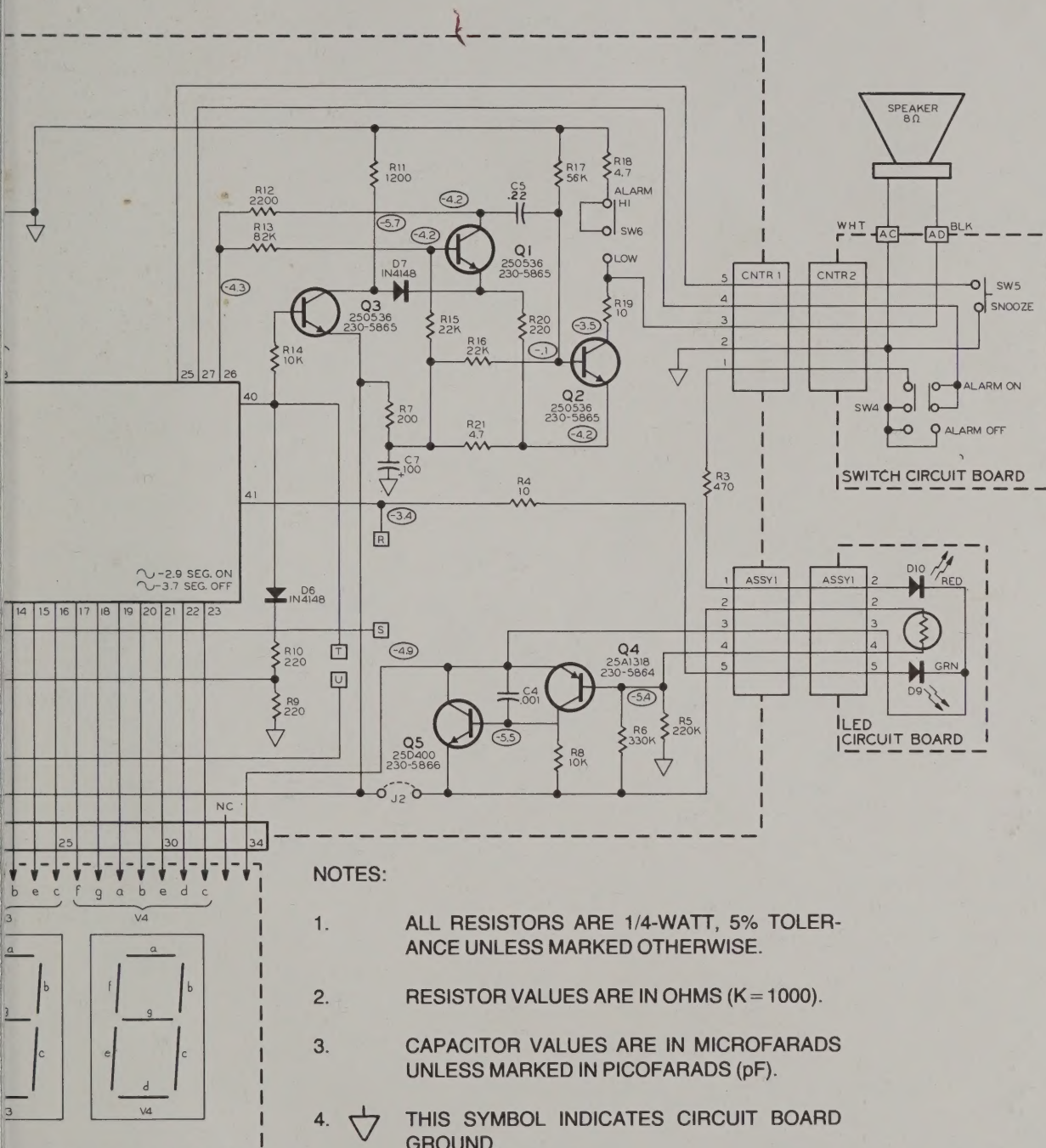
EFFECTIVE WARRANTY DATE — Warranty begins on the date of first consumer purchase. You must supply a copy of your proof of purchase when you request warranty service or parts.

ASSEMBLY — Before seeking warranty service, you should complete the assembly by carefully following the manual instructions. Heathkit service agencies cannot complete assembly and adjustments that are customer's responsibility.



ACCESSORY EQUIPMENT — Performance malfunctions involving other non-Heath accessory equipment, (antennas, audio components, computer peripherals and software, etc.) are not covered by this warranty and are the owner's responsibility.

SHIPPING UNITS — Follow the packing instructions published in the assembly manuals. Damage due to inadequate packing cannot be repaired under warranty.

If you are not satisfied with our service (warranty or otherwise) or our products, write directly to our Director of Customer Service, Heath Company, Benton Harbor MI 49022. He will make certain your problems receive immediate, personal attention.



NOTES:

1. ALL RESISTORS ARE 1/4-WATT, 5% TOLERANCE UNLESS MARKED OTHERWISE.
2. RESISTOR VALUES ARE IN OHMS (K=1000).
3. CAPACITOR VALUES ARE IN MICROFARADS UNLESS MARKED IN PICO FARADS (pF).
4.  THIS SYMBOL INDICATES CIRCUIT BOARD GROUND.
5.  THIS SYMBOL INDICATES A DC VOLTAGE.
6. ALL DC VOLTAGES WERE TAKEN WITH A HIGH-INPUT IMPEDANCE DC VOLTMETER FROM THE INDICATED PIN TO CIRCUIT BOARD GROUND. VOLTAGES MAY VARY $\pm 10\%$.
7. ALL AC VOLTAGES ARE MEASURED TO GROUND.

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SUCH REPAIR AND REPLACEMENT SHALL BE THE SOLE REMEDY OF THE CUSTOMER AND THERE SHALL BE NO LIABILITY ON THE PART OF HEATH FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORESEEABLE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Owner's Responsibility

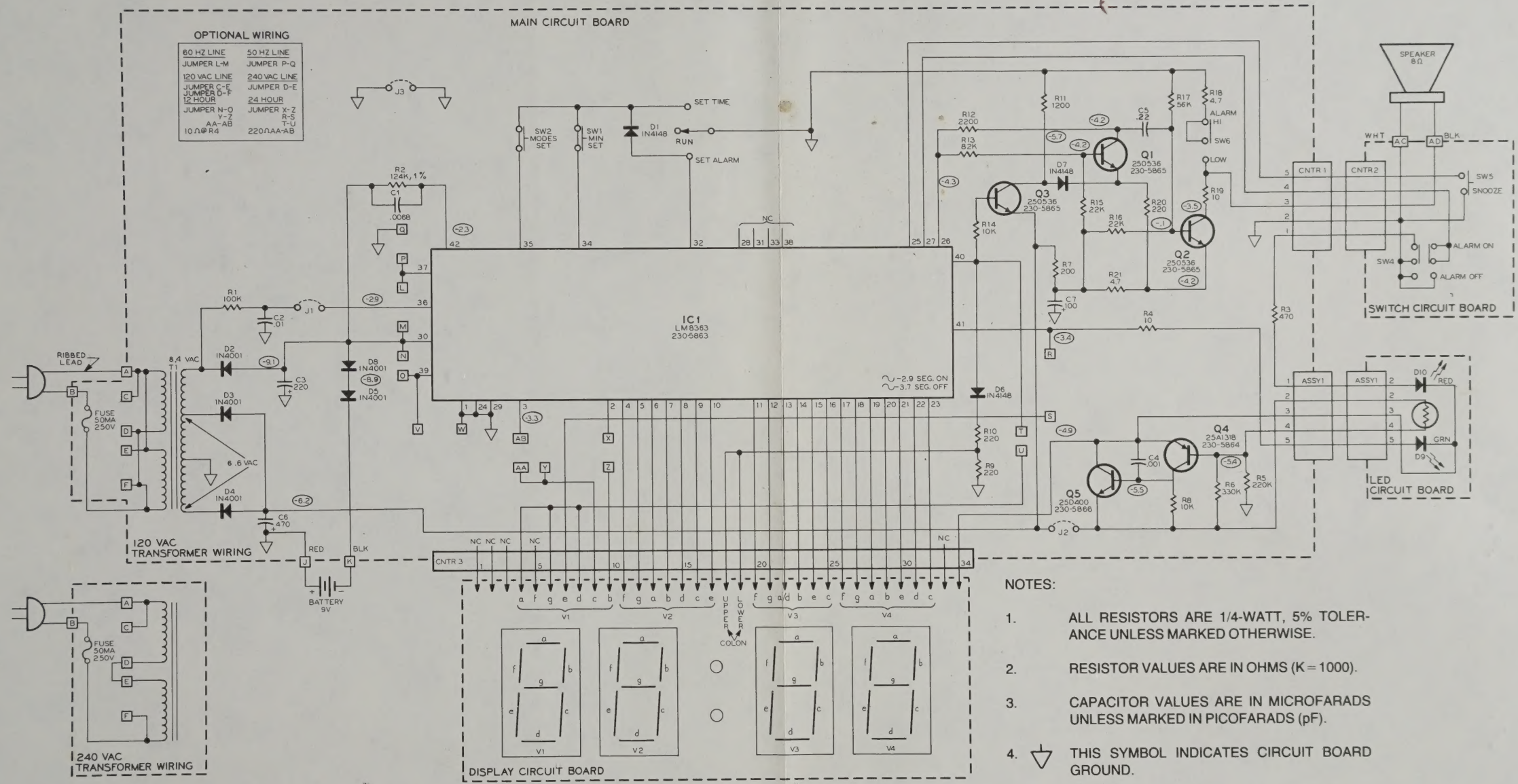
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**SCHEMATIC OF THE
HEATHKIT
DIGITAL CLOCK
Model GC-1108**

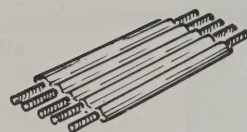
- NOTES:**
1. ALL RESISTORS ARE 1/4-WATT, 5% TOLERANCE UNLESS MARKED OTHERWISE.
 2. RESISTOR VALUES ARE IN OHMS (K = 1000).
 3. CAPACITOR VALUES ARE IN MICROFARADS UNLESS MARKED IN PICO FARADS (pF).
 4. THIS SYMBOL INDICATES CIRCUIT BOARD GROUND.
 5. THIS SYMBOL INDICATES A DC VOLTAGE.
 6. ALL DC VOLTAGES WERE TAKEN WITH A HIGH-INPUT IMPEDANCE DC VOLTMETER FROM THE INDICATED PIN TO CIRCUIT BOARD GROUND. VOLTAGES MAY VARY ± 10%.
 7. ALL AC VOLTAGES ARE MEASURED TO GROUND.

ILLUSTRATION BOOKLET

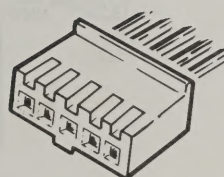
LED INDICATOR AND SWITCH CIRCUIT BOARD PARTS PICTORIAL

Part of 595-3730-02

A1



A2



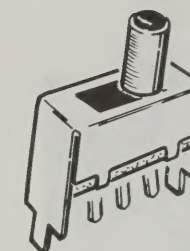
B1



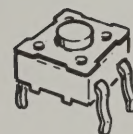
B2



B3



B4



C1



C2

CAUTION: FOR CONTINUED PROTECTION
AGAINST FIRE, REPLACE ONLY WITH FUSE
OF THE SPECIFIED VOLTAGE AND CURRENT
RATING. 390-2941

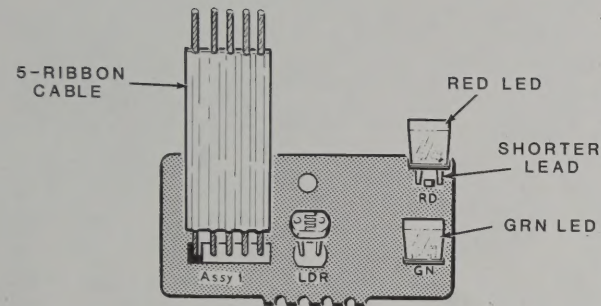
C3

Heathkit

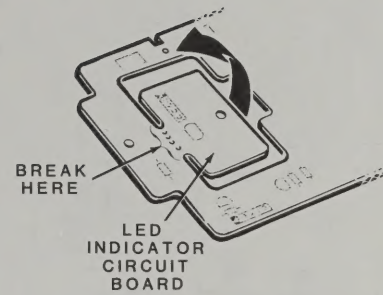
HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022
MODEL GC-1108
120/240 VAC 50/60 Hz 4 WATTS

CAUTION:
DISCONNECT LINE CORD
BEFORE REMOVING CABINET.

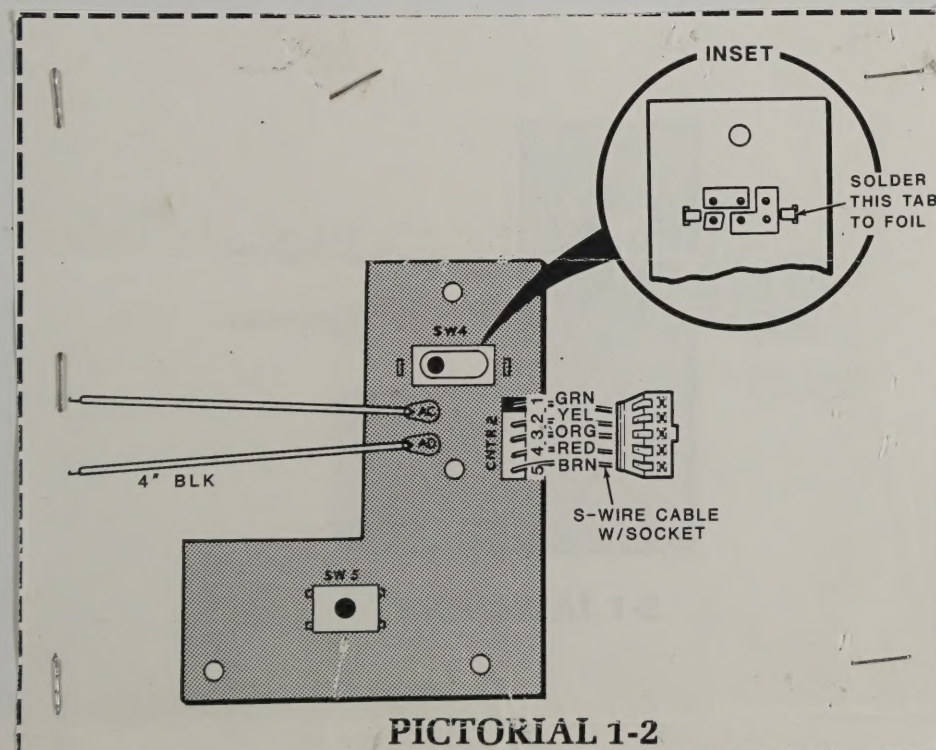
Model GC-1108



PICTORIAL 1-1

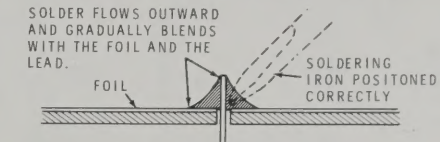


Detail 1-1A



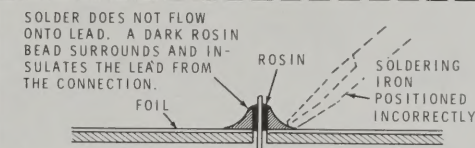
PICTORIAL 1-2

A GOOD SOLDER CONNECTION

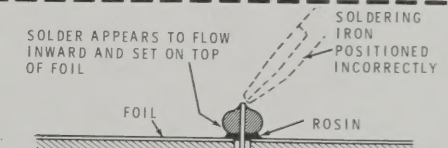


When you heat the lead and the circuit board foil at the same time, the solder will flow evenly onto the lead and the foil. The solder will make a good electrical connection between the lead and the foil.

POOR SOLDER CONNECTIONS



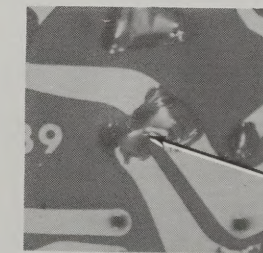
When the lead is not heated sufficiently, the solder will not flow onto the lead as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.



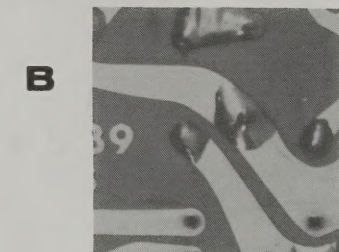
When the foil is not heated sufficiently the solder will blob on the circuit board as shown above. To correct, reheat the connection and, if necessary, apply a small amount of additional solder to obtain a good connection.

SOLDER BRIDGES

A solder bridge between two adjacent foils is shown in photograph A. Photograph B shows how the connection should appear. A solder bridge may occur if you accidentally touch an adjacent previously soldered connection, if you use too much solder, or if you "drag" the soldering iron across other foils as you remove it from the connection. A good rule to follow is: always take a good look at the foil area around each lead before you solder it. Then, when you solder the connection, make sure the solder remains in this area and does not bridge to another foil. This is especially important when the foils are small and close together. NOTE: It is alright for solder to bridge two connections on the same foil.



A
SOLDER BRIDGE



B

Use only enough solder to make a good connection, and lift the soldering iron straight up from the circuit board. If a solder bridge should develop, turn the circuit board foil-side-down and heat the solder between connections. The excess solder will run onto the tip of the soldering iron, and this will remove the solder bridge. NOTE: The foil side of most circuit boards has a coating on it called "solder resist." This is a protective insulation to help prevent solder bridges.

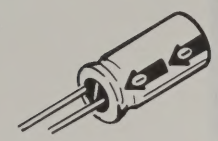
Detail 1-2A

Main Circuit Board Parts Pictorial

A1



A2



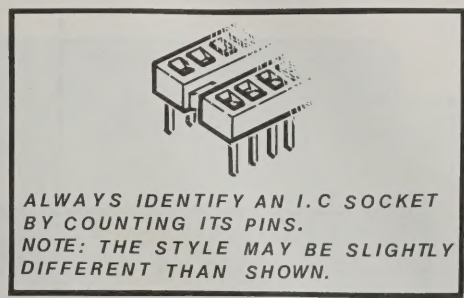
B1



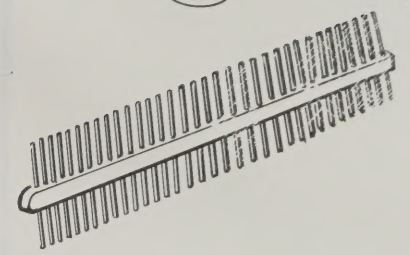
B2



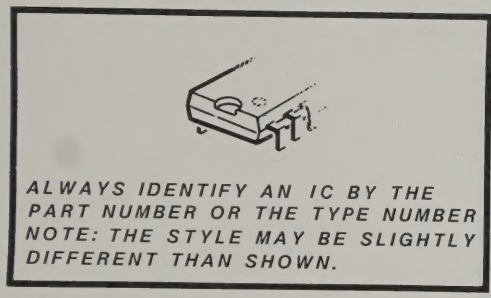
E2



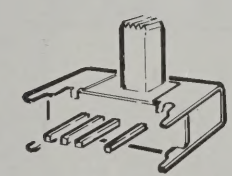
E3



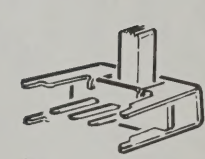
B3



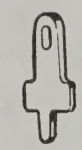
C1



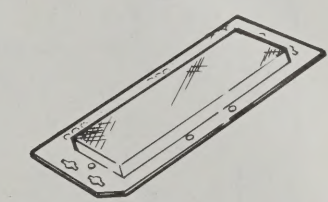
C2



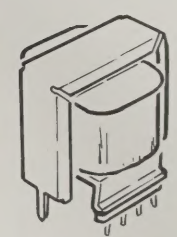
E4



F1



F2



F4



C3



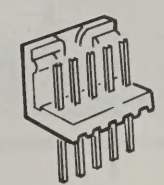
D1



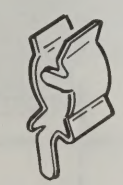
D2



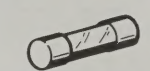
E1



F5



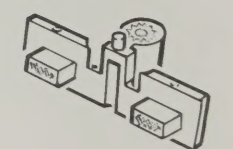
F6

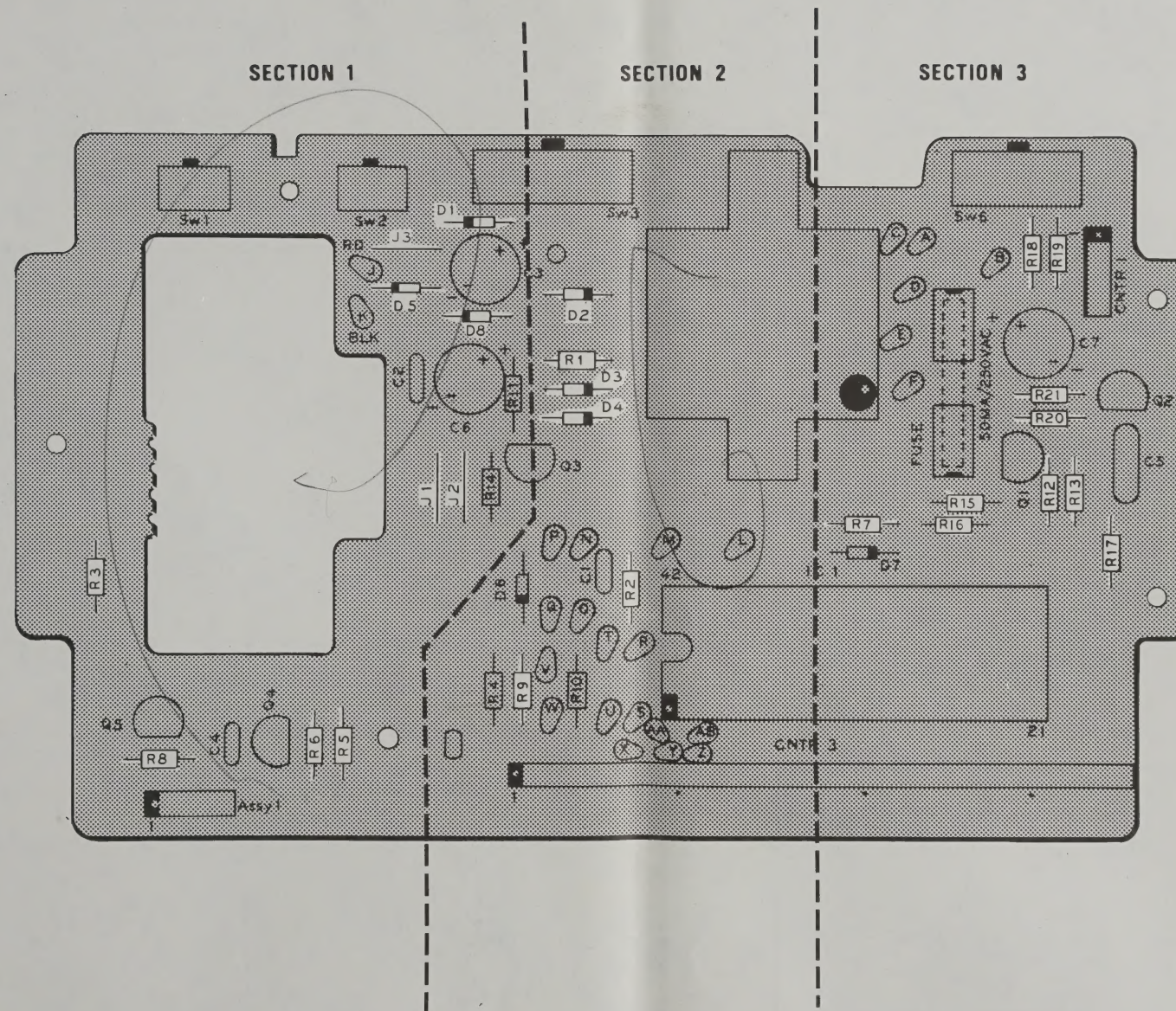


F7

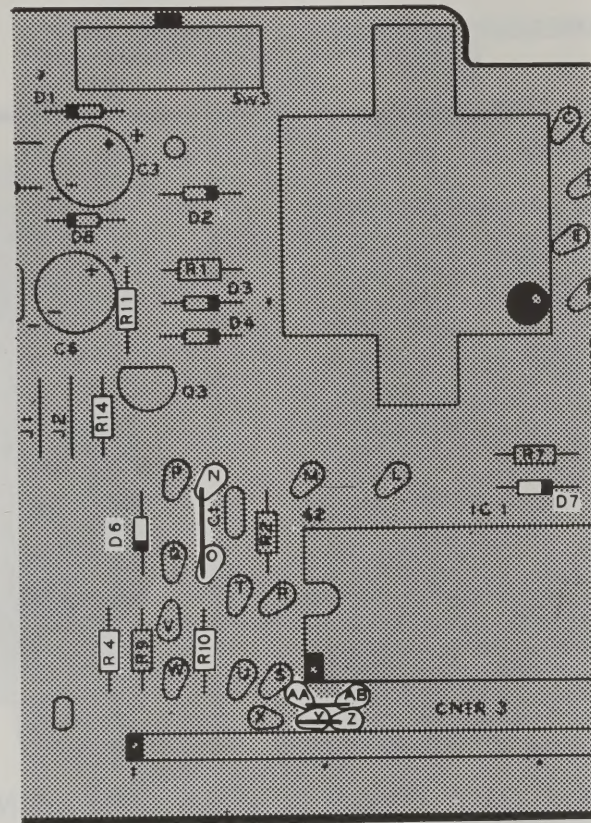


F8



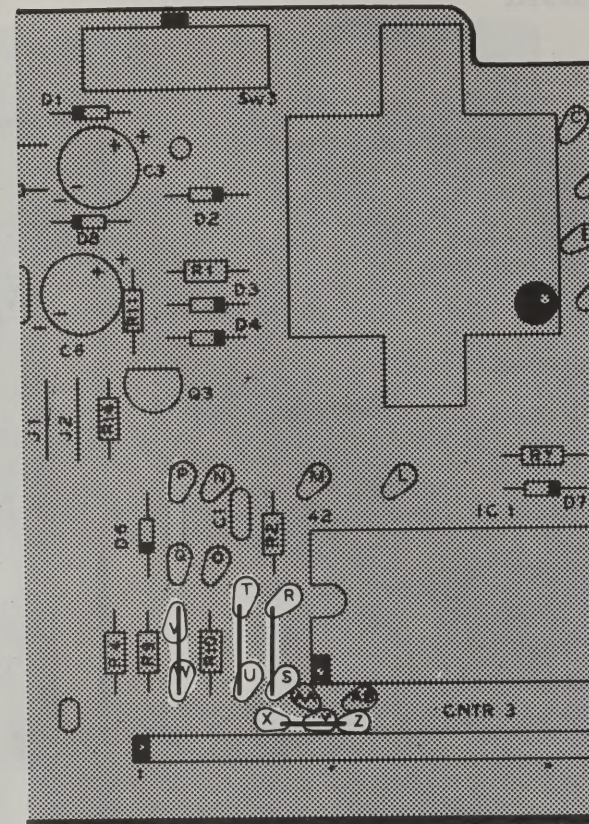


PICTORIAL 2-1



12-HOUR DISPLAY MODE

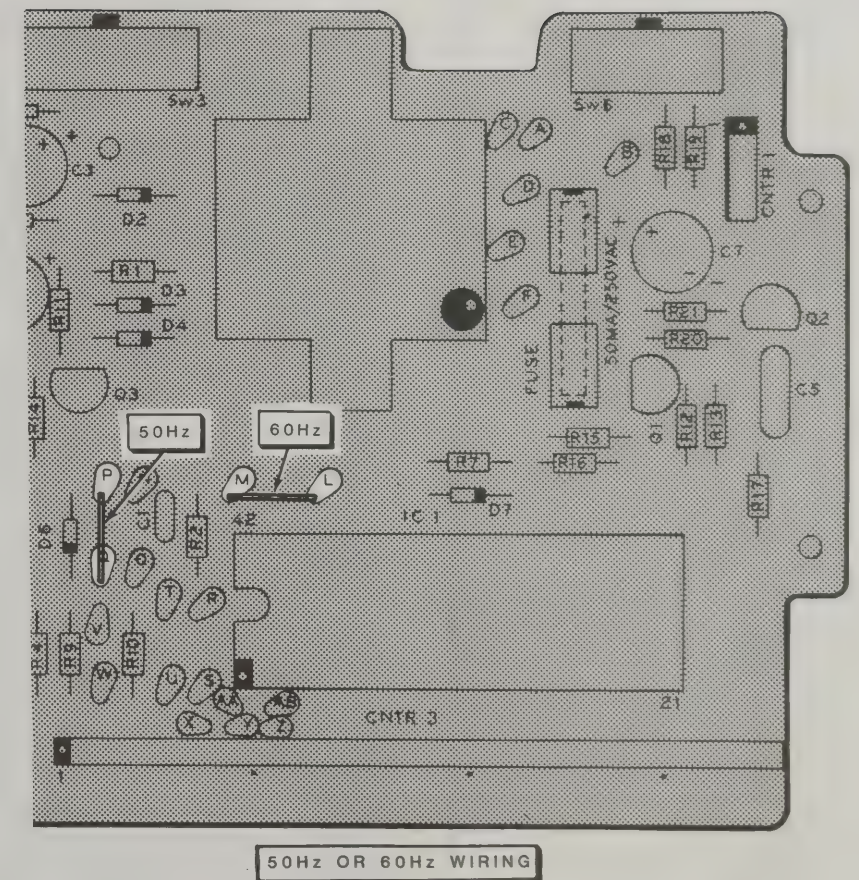
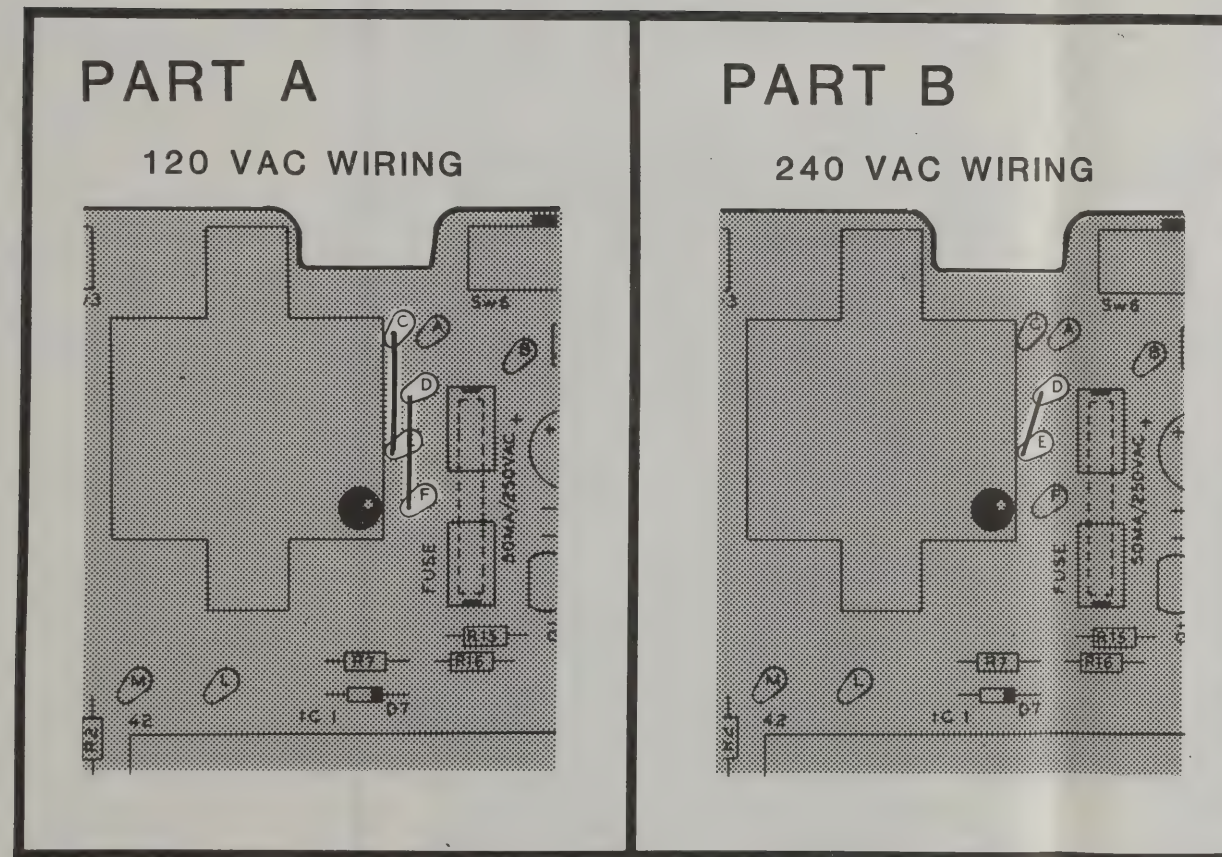
PART A

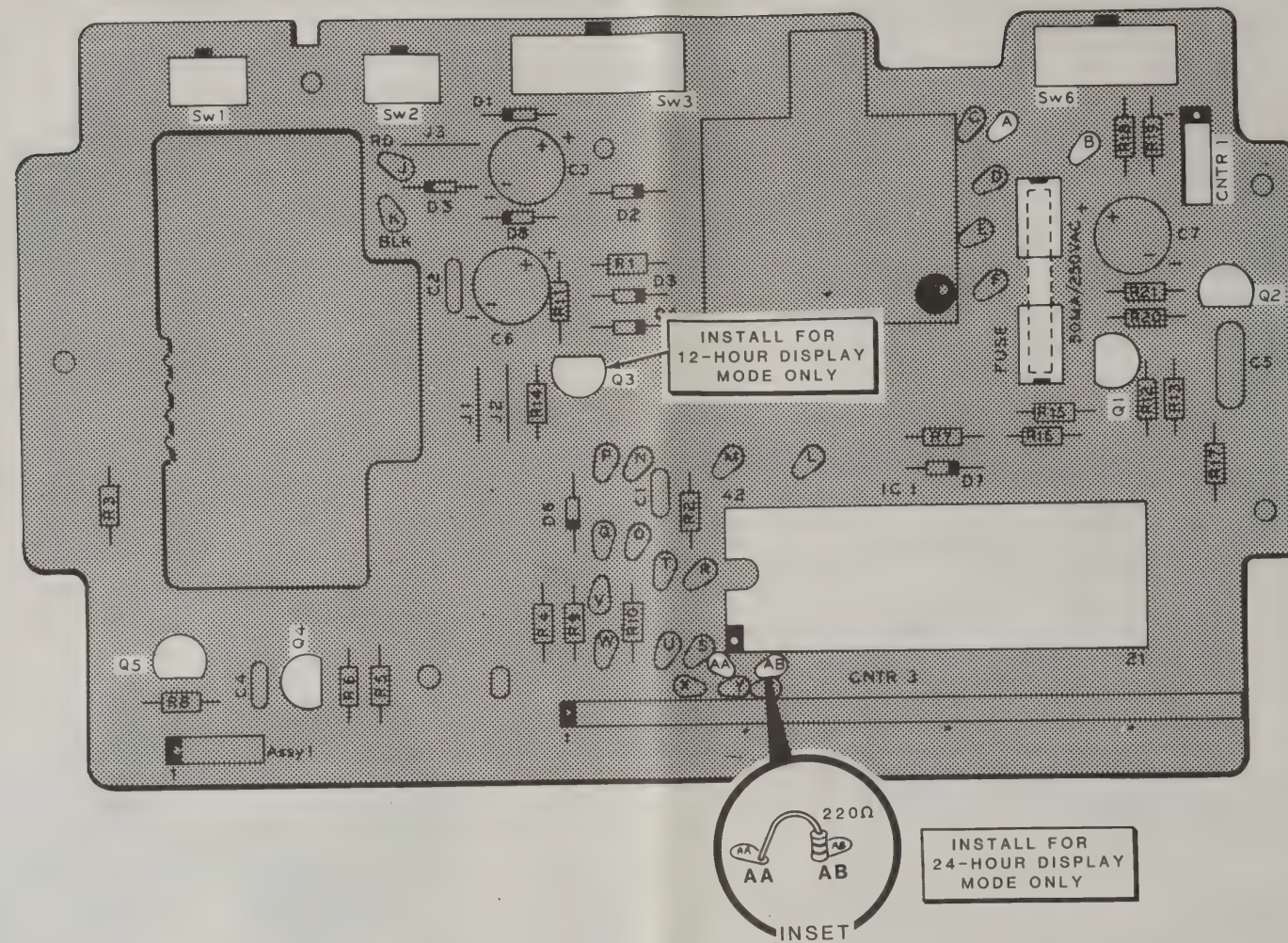


24-HOUR DISPLAY MODE

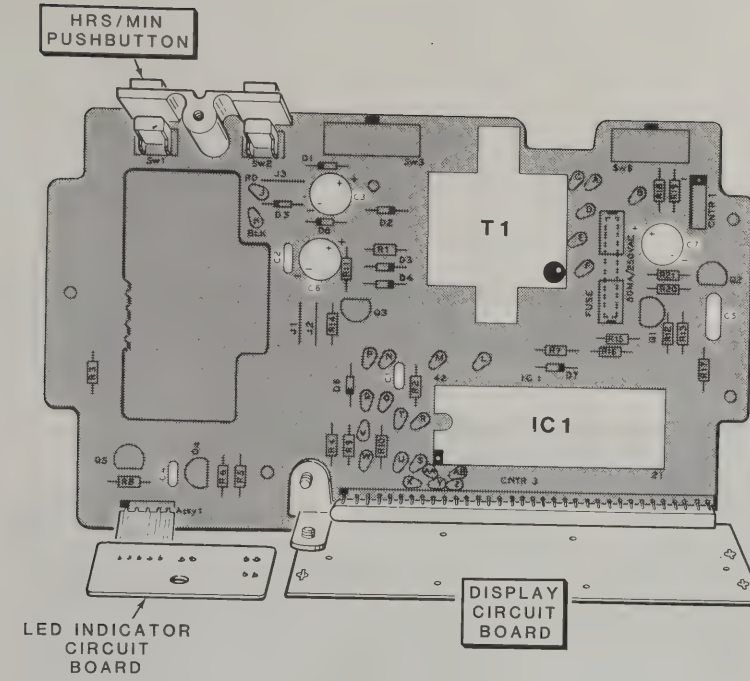
PART B

PICTORIAL 2-2

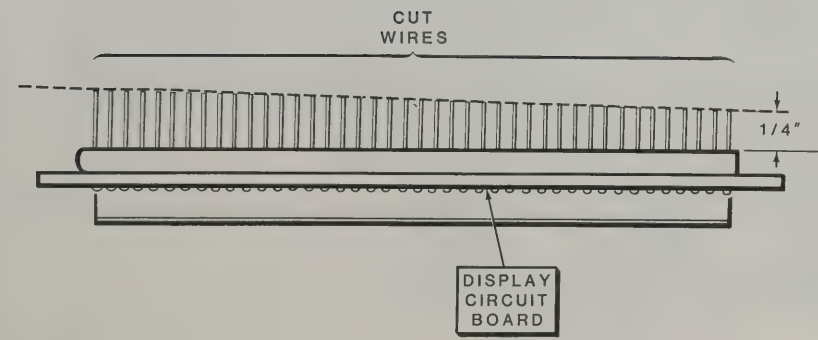




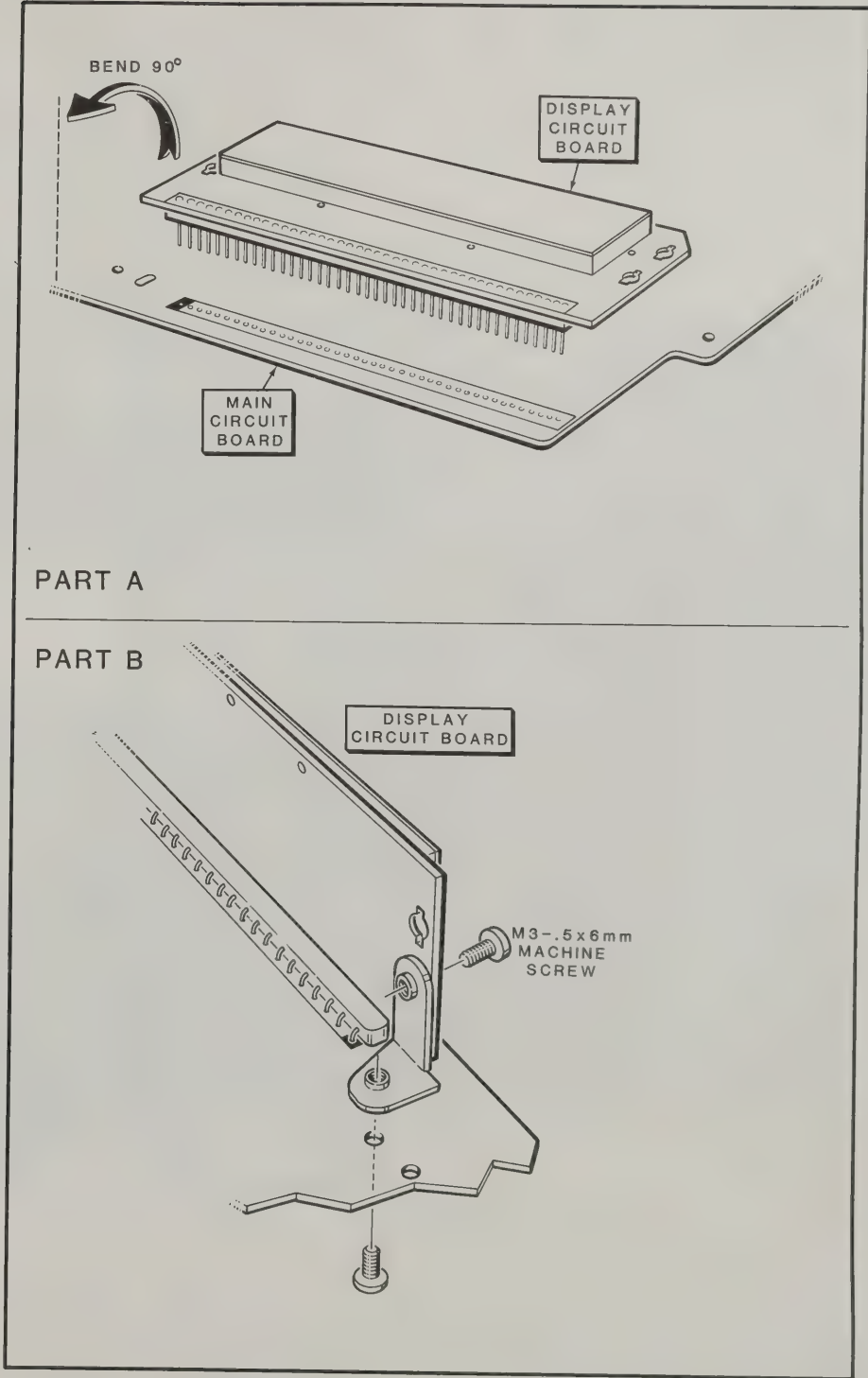
PICTORIAL 2-5



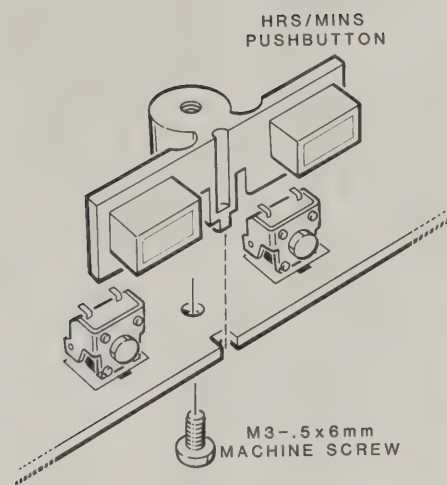
PICTORIAL 2-6



Detail 2-6A



Detail 2-6B



Detail 2-6C

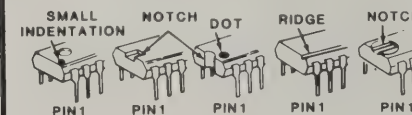
The pins on the IC's may be bent out at an angle, so they do not line up with the holes in the IC socket. DO NOT try to install an IC without first bending the pins as described below. To do so may damage the IC pins or the socket, causing intermittent contact.



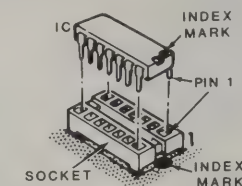
Before you install an IC, lay it down on its side as shown below and very carefully roll it toward the pins to bend the lower pins into line. Then turn the IC over and bend the pins on the other side in the same manner.



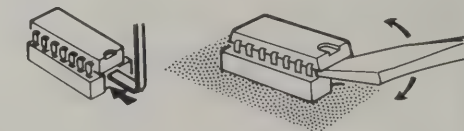
Compare the IC to the drawing shown below. Then determine which end of the IC is the pin 1 end.



Position the pin 1 end of the IC over the index mark on the circuit board. Then start the pins into the socket. Make sure that **all** of the pins are started; then push the IC down firmly. NOTE: An IC pin can become bent under the IC and it will appear as though it is correctly installed in the socket.

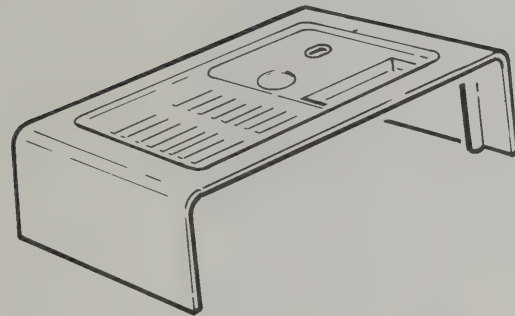


If it is ever necessary to remove an IC from its socket, use an IC puller (if one was supplied with your kit) or a small-bladed screwdriver as shown. Push the end of the IC puller or screwdriver blade between the IC and the socket and carefully lift the IC free. If any IC pins become bent, straighten them carefully.

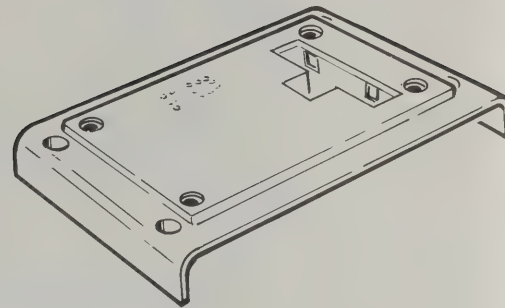


Detail 2-6D

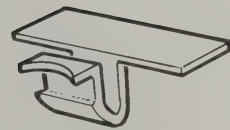
A1



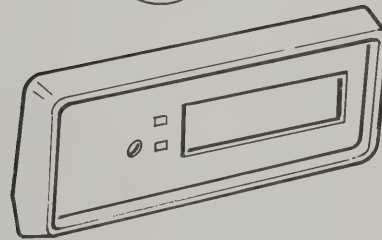
A2



A3



A4



A5



A6



B1



B2



B3



B4



B5



C1



C2



C3



C4



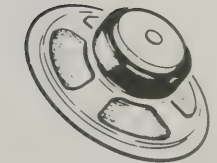
C5



C6



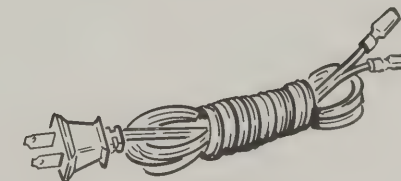
C7



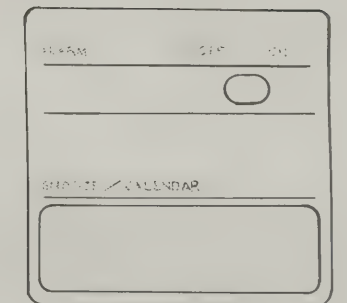
C8

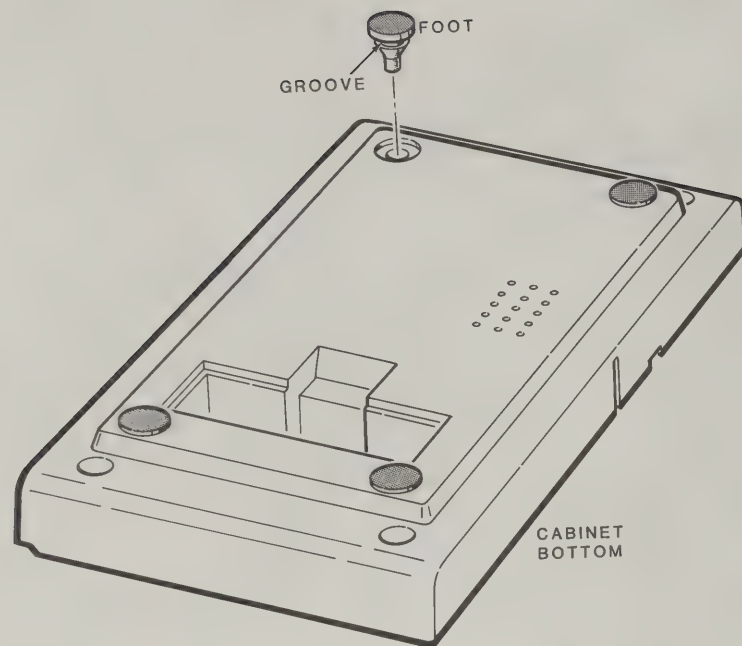


C9

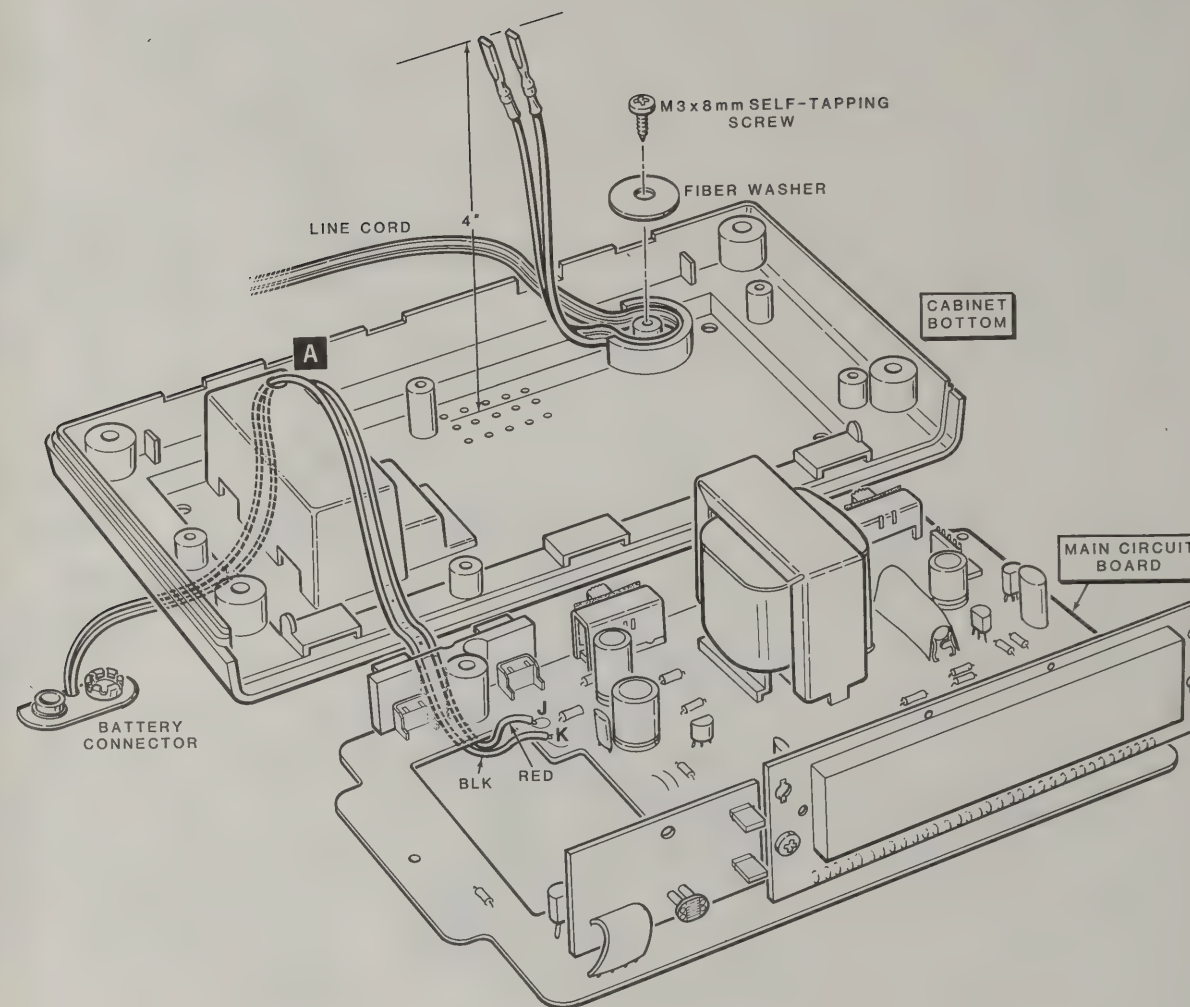


C10

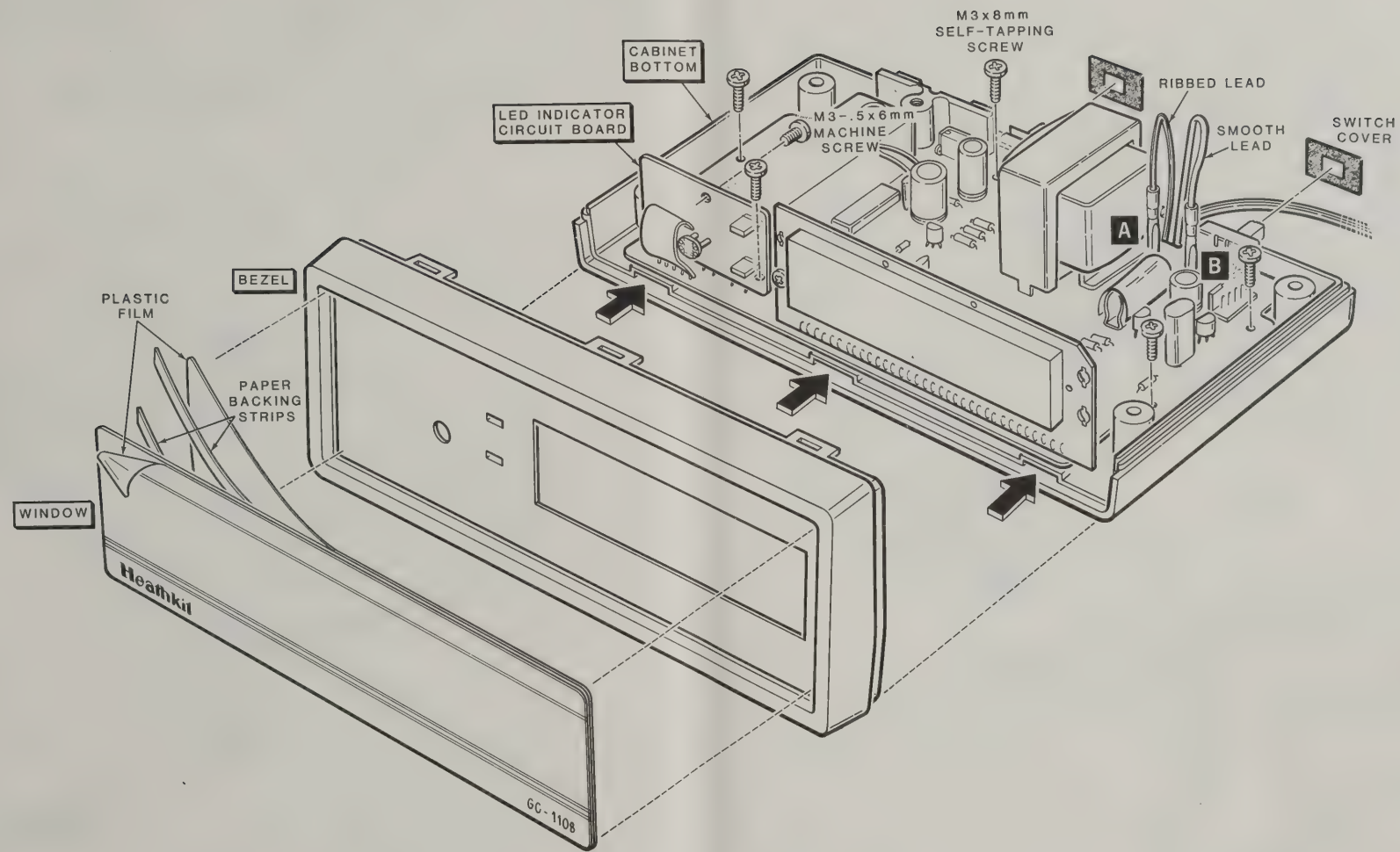




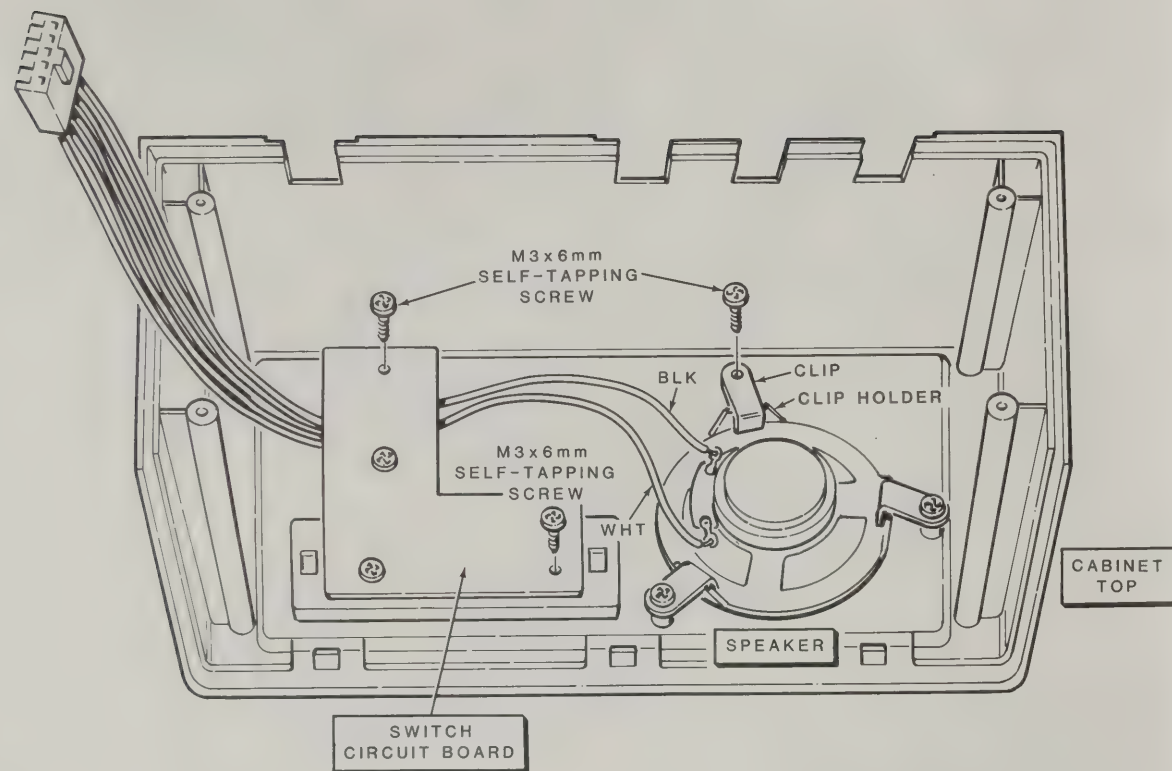
PICTORIAL 3-1



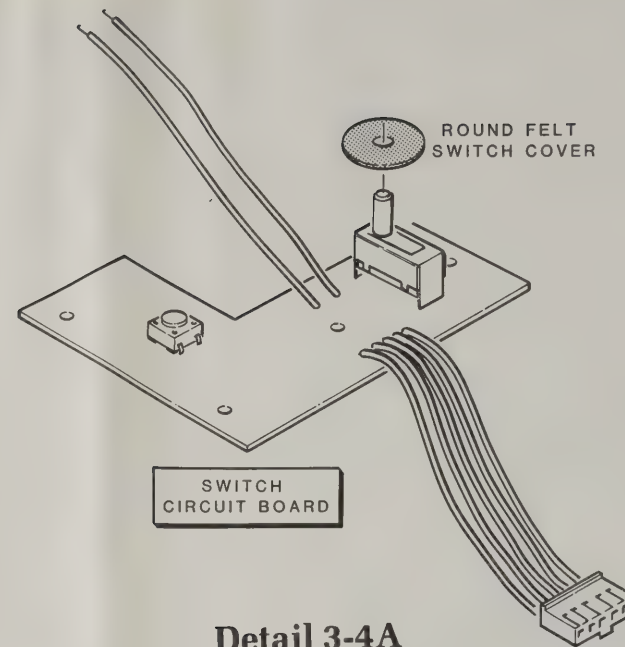
PICTORIAL 3-2



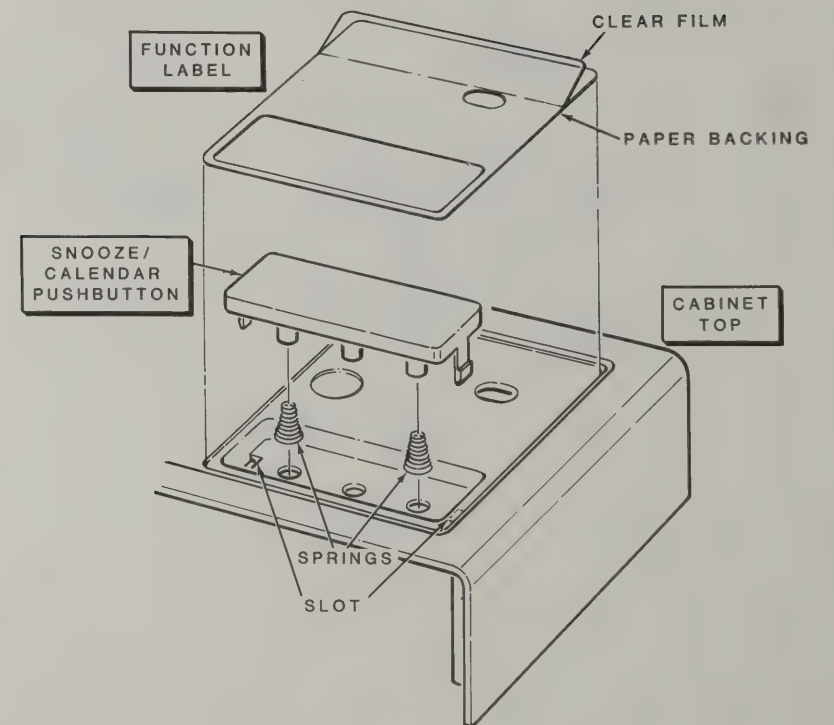
PICTORIAL 3-3



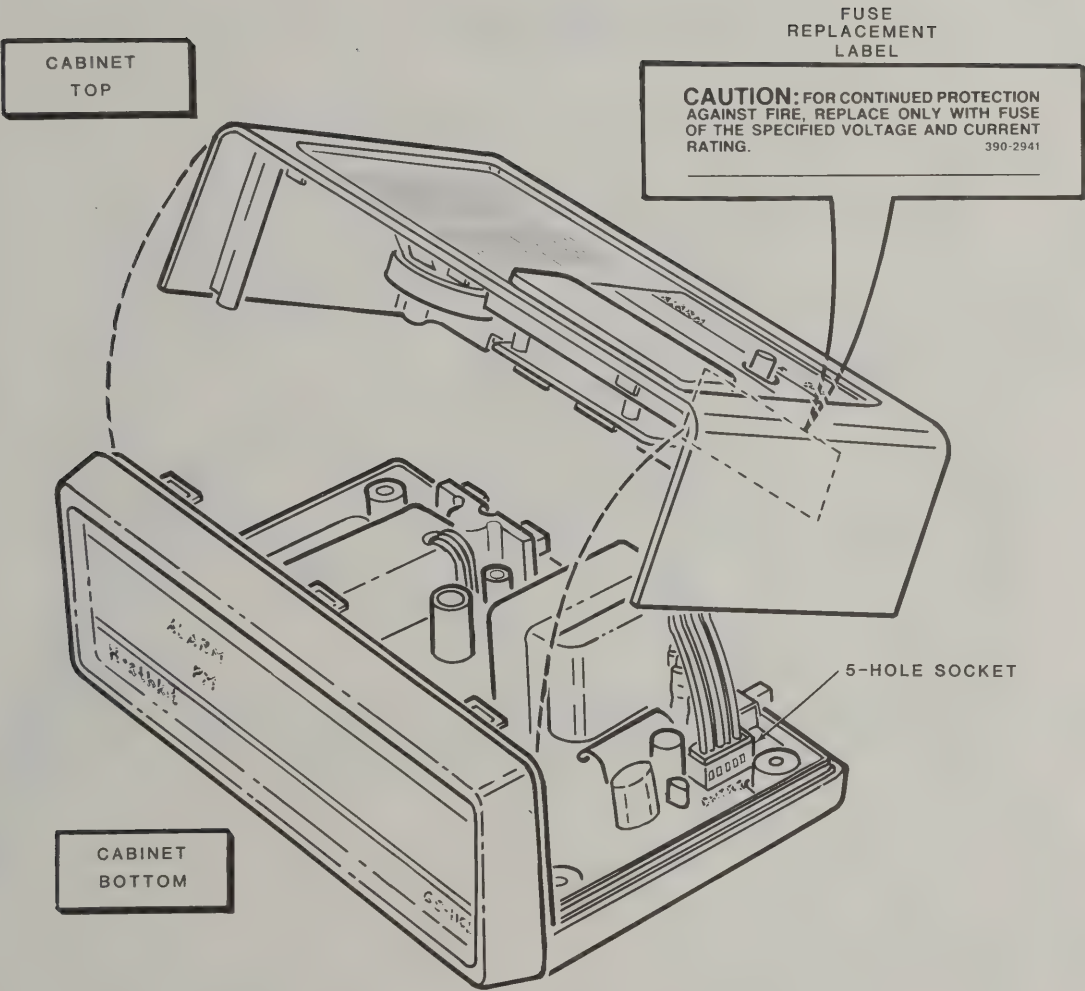
PICTORIAL 3-4



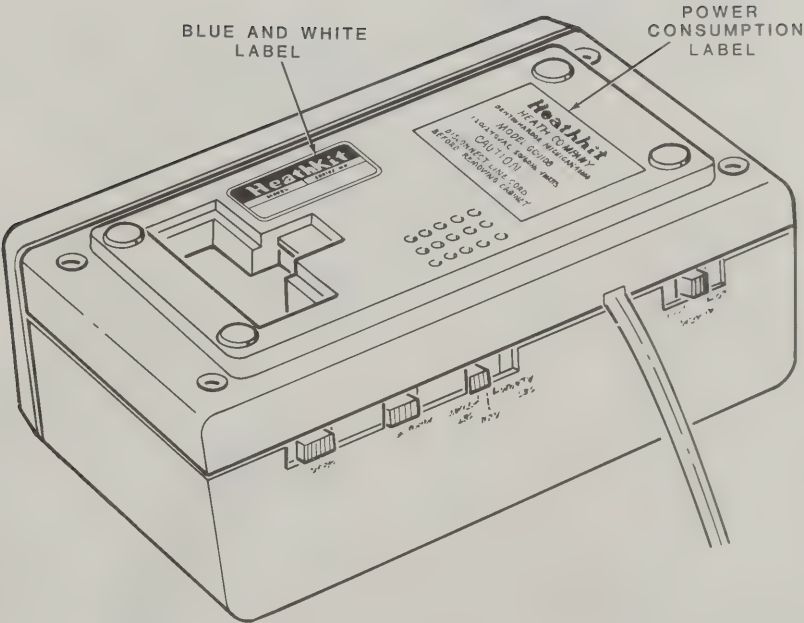
Detail 3-4A



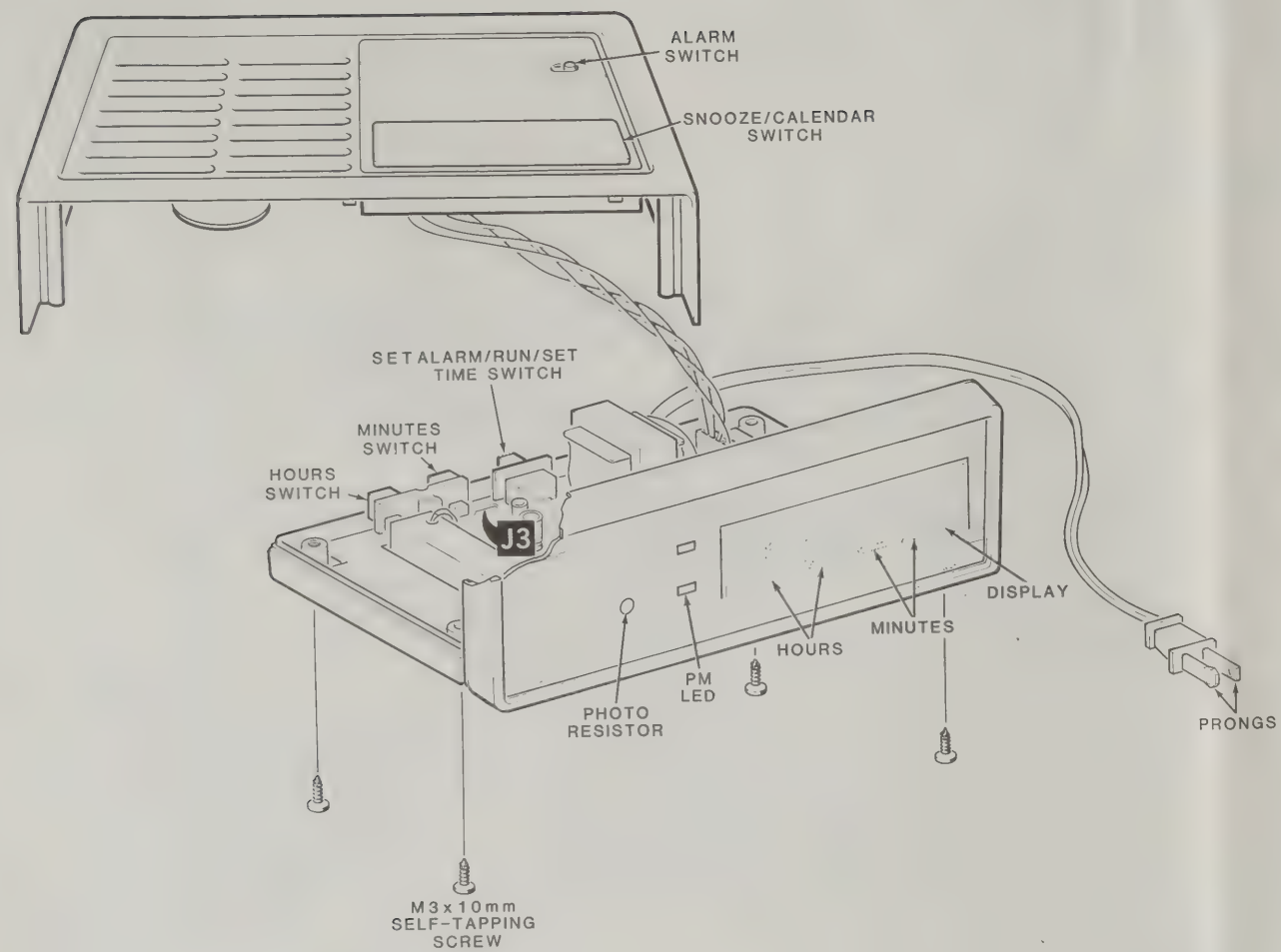
Detail 3-4B



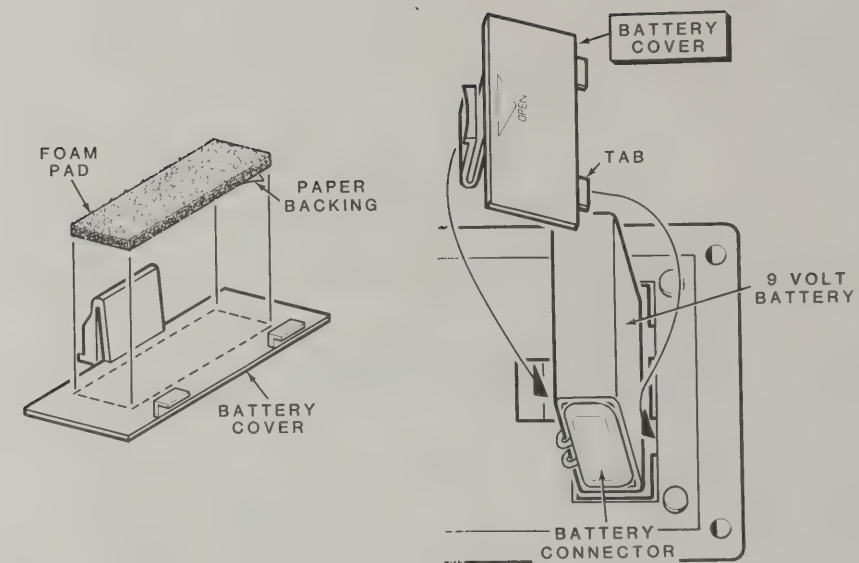
PICTORIAL 3-5



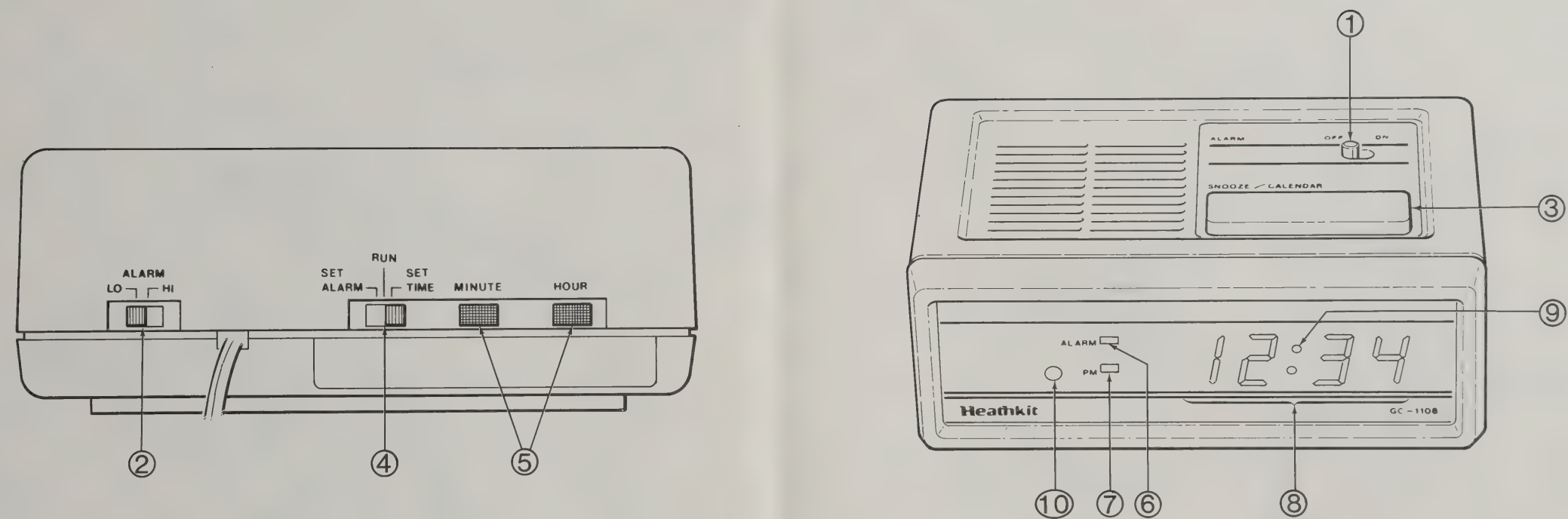
Detail 3-5A



PICTORIAL 4-1



PICTORIAL 5-1

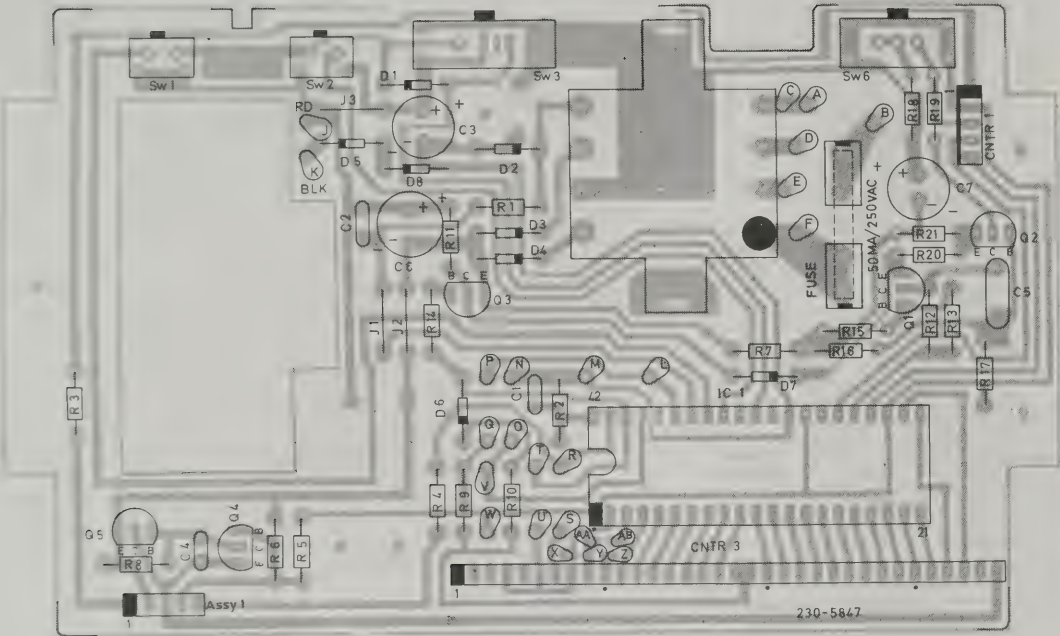


PICTORIAL 5-2

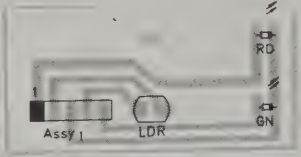
CIRCUIT BOARD X-RAY VIEWS

To find the PART NUMBER of a component for the purpose of ordering a replacement part:

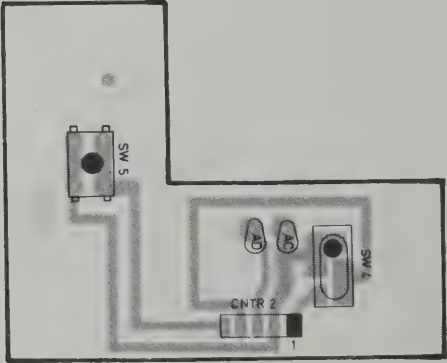
- A. Find the circuit component part number on the appropriate X-Ray View.
- B. Locate the same number in the "Circuit Component Number" column of the corresponding "Parts List".
- C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION, which you must supply when you order a replacement part.



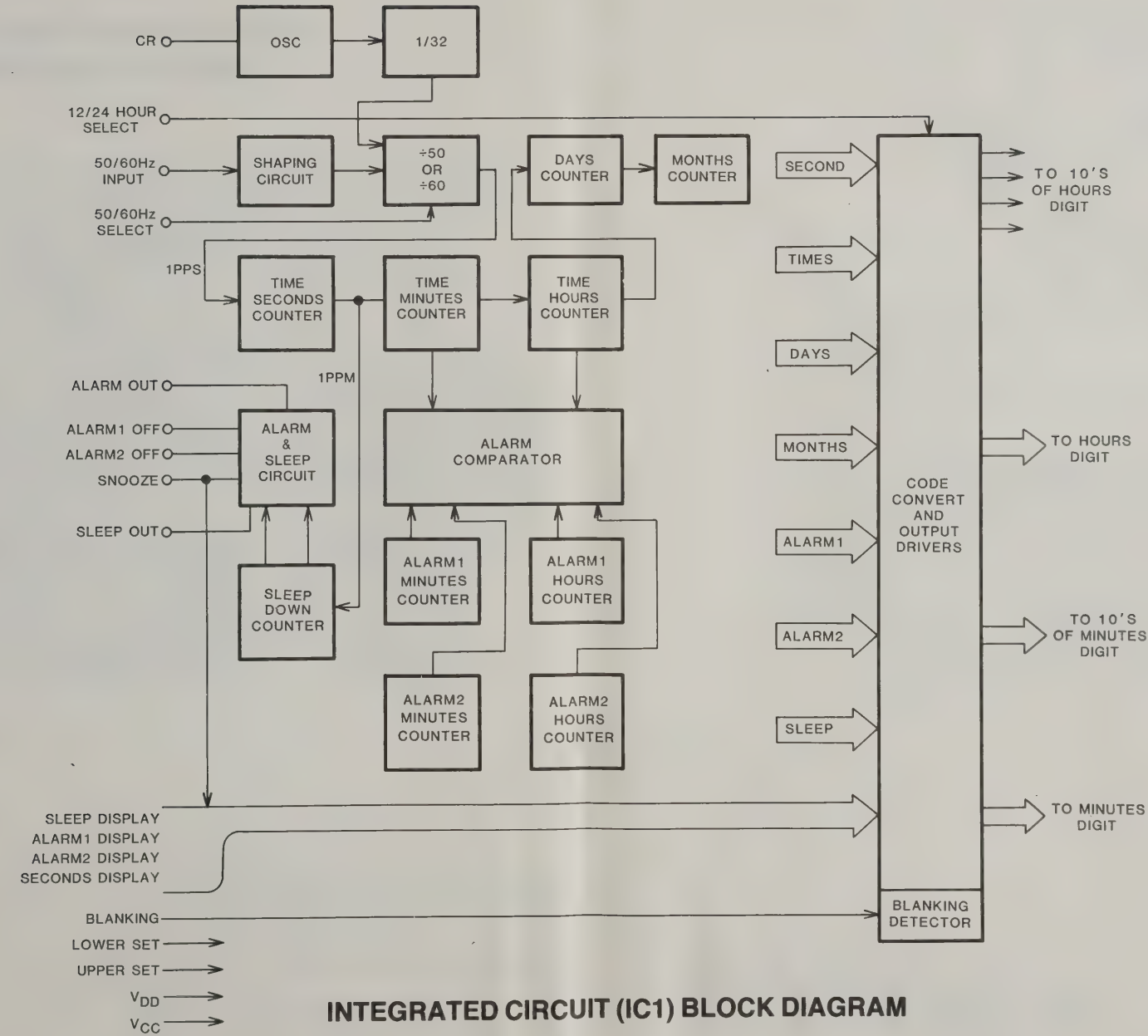
MAIN CIRCUIT BOARD
(Viewed from component side)



LED INDICATOR CIRCUIT BOARD
(Viewed from component side)



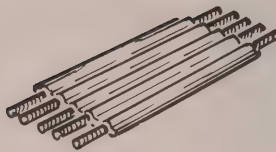
SWITCH CIRCUIT BOARD
(Viewed from component side)



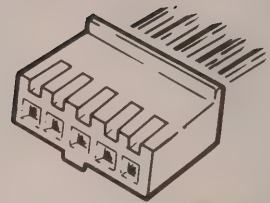
ILLUSTRAT

LED INDICATOR ANI
PARTS

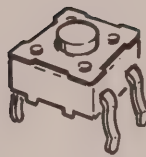
A1



A2



B4



C1



PURCHASED 2-26-86

\$24.95

SER NO. 03 71255

MOD NO. GC 1108

DIGITAL CLOCK

Model GC-1108

595-3730-02

WARNING: TO PREVENT FIRE OR ELECTRICAL SHOCK HAZARD, DO NOT EXPOSE THIS CLOCK TO RAIN OR MOISTURE.

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

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INTRODUCTION

The Heathkit Digital Clock, Model GC-1108, displays the hour(s) and minute(s) in either a 12- or 24-hour format, depending on the wiring procedure you choose when you assemble it. If you choose the 12-hour display mode, a red PM indicator will light during its appropriate time period, and a blinking colon will count the seconds.

In the 24-hour mode, the PM indicator will always be off and the colon will remain on continuously. The 24-hour alarm has a continuous tone, while the 12-hour mode has a beeping tone. A snooze pushbutton on the top of the cabinet causes the alarm to sound after a 9-minute interval whenever you press it.

You can operate the Clock from either 120 VAC or 240 VAC line voltage, and from either a 50 Hz or 60 Hz line frequency. If the line voltage is interrupted due to a power failure, the Clock uses a 9-volt battery (not supplied) to keep the internal clock circuitry running until power is resumed. In order to conserve battery life during power outages, the LED displays and alarm circuitry are inoperative.

The latest in large scale integration (LSI) circuitry has also been used and the time and date are displayed in large 4-digit, 7-segment LEDs. The colon separates the hour(s) from the minute(s) and the month from the day.

This Digital Clock is both dependable and easy to use. It is attractively styled in a dark gray cabinet that will complement any surrounding in which it is placed.

NOTE: You will need a 9-volt battery to use with your kit. We suggest that you purchase one before you complete your kit so you have it during the testing. For longer life, we recommend that you use an alkaline battery. Representative manufacturers and their type numbers are:

NEDA #1604 (carbon-zinc battery)
NEDA #1604A (alkaline battery)
Burgess #2U6
Duracell #MN1604
Eveready #216 or #522 (alkaline)
Mallory #M1604 or #MN1604 (alkaline)
Ray-O-Vac #1604 or #A-1604 (alkaline)
RCA #VS323

UNPACKING

Your kit is packed in one carton which contains Pack 1, Pack 2, and a Final Pack. Packs 1 and 2 contain the circuit board parts. The remaining parts are considered the "Final Pack." Some of these are wrapped. You will be instructed to open Pack 1 first.

Do not remove any other Packs until you are instructed to do so. Each Pack has its own Parts List and unpacking instructions, which you should read carefully.

ASSEMBLY NOTES

TOOLS

You will need these tools to assemble your kit.



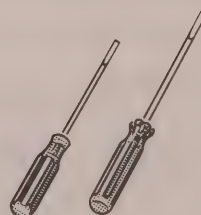
LONG-NOSE
PLIERS



DIAGONAL
CUTTERS



WIRE
STRIPPERS



1/8" & 1/4"-BLADE
SCREWDRIVERS



PHILLIPS
SCREWDRIVER

OTHER HELPFUL TOOLS



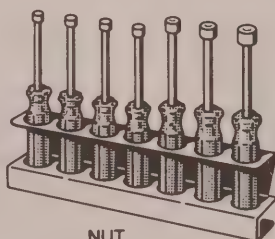
NUT STARTER
(May Be Supplied
With Kit)



DESOLDERING
BULB*

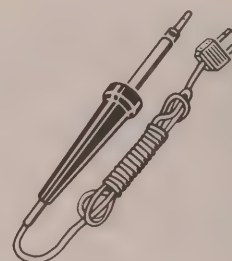


DESOLDERING
BRAID*



NUT
DRIVERS

*To Remove Solder From Circuit Connections.



PENCIL
SOLDERING IRON
(22 to 25 WATTS)

ASSEMBLY

1. Follow the instructions carefully. Read the entire step before you perform each operation.
2. The illustrations in the Manual are called Pictorials and Details. Pictorials show the overall operation for a group of assembly steps; Details generally illustrate a single step. When you are directed to refer to a certain Pictorial "for the following steps," continue using that Pictorial until you are referred to another Pictorial for another group of steps.
3. Most kits use a separate "Illustration Booklet" that contains illustrations (Pictorials, Details, etc.) that are too large for the Assembly Manual. Keep the "Illustration Booklet" with the Assembly Manual. The illustrations in it are arranged in Pictorial number sequence.
4. Position all parts as shown in the Pictorials.
5. Solder instructions are generally given only at the end of a series of similar steps. You may solder more often if you desire.

6. Each circuit part in an electronic kit has its own component number (R2, C4, etc.). Use these numbers when you want to identify the same part in the various sections of the Manual. These numbers, which are especially useful if a part has to be replaced, appear:
 - In the Parts List,
 - At the beginning of each step where a component is installed,
 - In some illustrations,
 - In Troubleshooting Charts,
 - In the Schematic,
 - In the sections at the rear of the Manual.
7. When you are instructed to cut something to a particular length, use the scales (rulers) provided at the bottom of the Manual pages.

SAFETY WARNING: Avoid eye injury when you cut off excessive lead lengths. Hold the leads so they cannot fly toward your eyes.

SOLDERING

Soldering is one of the most important operations you will perform while assembling your kit. A good solder connection will form an electrical connection between two parts, such as a component lead and a circuit board foil. A bad solder connection could prevent an otherwise well-assembled kit from operating properly.

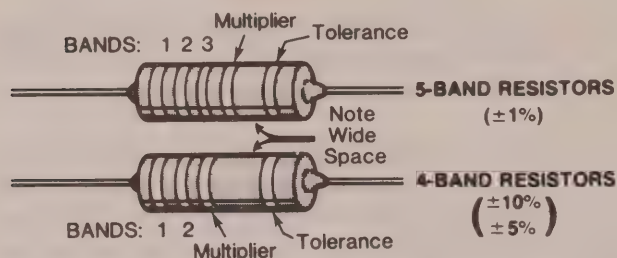
It is easy to make a good solder connection if you follow a few simple rules:

1. Use the right type of soldering iron. A 22 to 25-watt pencil soldering iron with a 1/8" or 3/16" chisel or pyramid tip works best.
2. Keep the soldering iron tip clean. Wipe it often on a wet sponge or cloth; then apply solder to the tip to give the entire tip a wet look. This process is called tinning, and it will protect the tip and enable you to make good connections. When solder tends to "ball" or does not stick to the tip, the tip needs to be cleaned and re-tinned.

NOTE: Always use rosin core, radio-type solder (60:40 tin-lead content) for all of the soldering in this kit. This is the type we have supplied with the parts. The Warranty will be void and we will not service any kit in which acid core solder or paste has been used.

RESISTORS

Resistors are identified in Parts Lists and steps by their resistance value in Ω (ohms), $k\Omega$ (kilohms), or $M\Omega$ (megohms). They are usually identified by a color code of four or five color bands, where each color represents a number. See the "Resistor Color Code" chart. These colors are given in the steps in their proper order (except for the last band, which indicates a resistor's "tolerance"; see the "Resistor Tolerance Chart"). You do not need to memorize the color codes.



Occasionally, a "precision" or "power" resistor may have the value stamped on it. The letter R, K, or M may also be used at times to signify a decimal point, as in:

$$\begin{aligned} 2R2 &= 2.2 \Omega \\ 2K2 &= 2.2 k\Omega, \text{ or } 2200 \Omega \\ 2M2 &= 2.2 M\Omega \end{aligned}$$

Precision resistors may also be marked as shown in the following examples. The values of the multipliers are shown in the "Multiplier Chart," and the tolerance values are shown in the "Resistor Tolerance" chart.

Resistor Value Multiplier Tolerance

EXAMPLES: $1009C = 100 \times 0.1 = 10 \Omega, \pm 0.25\%$
 $1001D = 100 \times 10 = 1000 \Omega, \pm 0.5\%$

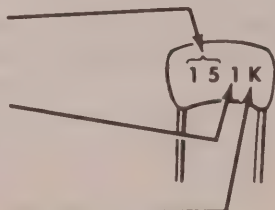
CAPACITORS

Capacitors will be called out by their capacitance value in μF (microfarads) or pF (picofarads) and type: ceramic, Mylar®, electrolytic, etc. Some capacitors may have their value printed in the following manner:

First and second digits of capacitor's value: 15

Multiplier: Multiply the first & second digits by the proper value from the "Multiplier Chart."

To find the tolerance of the capacitor, look up this letter in the capacitor Tolerance chart.



RESISTOR COLOR CODE CHART

	Band 1	Band 2	Band 3 (if used)	Multiplier
Color	1st Digit	2nd Digit	3rd Digit	
Black	0	0	0	1
Brown	1	1	1	10
Red	2	2	2	100
Orange	3	3	3	1,000
Yellow	4	4	4	10,000
Green	5	5	5	100,000
Blue	6	6	6	1,000,000
Violet	7	7	7	10,000,000
Gray	8	8	8	100,000,000
White	9	9	9	—
Silver	—	—	—	.01
Gold	—	—	—	.1

RESISTOR TOLERANCE CHART

	COLOR OR LETTER	
$\pm 10\%$	SILVER	
$\pm 5\%$	GOLD	J
$\pm 2\%$	RED	G
$\pm 1\%$	BROWN	F
$\pm 0.5\%$	GREEN	D
$\pm 0.25\%$	BLUE	C
$\pm 0.1\%$	VIOLET	B
$\pm 0.05\%$	GRAY	

MULTIPLIER CHART

FOR THE NUMBER:	MULTIPLY BY:	FOR THE NUMBER:	MULTIPLY BY:
0	1	4	10,000
1	10	5	100,000
2	100	8	0.01
3	1000	9	0.1

CAPACITOR TOLERANCE CHART

LETTER	10 pF OR LESS	OVER 10 pF
B	$\pm 0.1 pF$	
C	$\pm 0.25 pF$	
D	$\pm 0.5 pF$	
F	$\pm 1.0 pF$	$\pm 1\%$
G	$\pm 2.0 pF$	$\pm 2\%$
H		$\pm 3\%$
J		$\pm 5\%$
K		$\pm 10\%$
M		$\pm 20\%$

EXAMPLES: $151K = 15 \times 10 = 150 pF$
 $759 = 75 \times 0.1 = 7.5 pF$

NOTE: The letter "R" may be used at times to signify a decimal point, as in: $2R2 = 2.2 (pF \text{ or } \mu F)$.

LED INDICATOR AND SWITCH CIRCUIT BOARDS

PARTS LIST

Remove the parts from Pack 1 (see Pack Index Sheet) and check each part against the following list. The key numbers correspond to the numbers on the "LED Indicator and Switch Circuit Boards Parts Pictorial." Return any part that is in an individual envelope back into the envelope after you have identified it until that part is called for in a step. Do not throw away any packing material until you account for all the parts.

To order a replacement part, always include the PART NUMBER. Use the Parts Order Form furnished with this kit. If a Parts Order Form is not

available, refer to "Replacement Parts" inside the rear cover of this Manual.

A replacement part may look slightly different than the original part, or may have different printing on it. In any case, the performance of the replacement part will meet or exceed the requirements of the original part. For example: A 15-volt capacitor (10 uF, 15V) may be replaced with a 25-volt capacitor (10 uF, 25V).

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

WIRE - SLEEVING - CABLES

✓	344-33	4"	Black wire	
✓	344-187	4"	White wire (2)	
✓	230-5877	2	1/4" small sleeving (includes one extra)	
✓	230-5879	1	1" large sleeving	
✓ A1	230-5828	1	5-wire ribbon cable	
✓ A2	230-5868	1	5-wire cable & socket	

MISCELLANEOUS

B1	230-5829	1	Light dependent resistor	LDR
B2	230-5860	1	Red LED	D10
B2	230-5862	1	Green LED	D9
B3	230-5855	1	Slide switch	SW4

*Located inside the Manual.

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

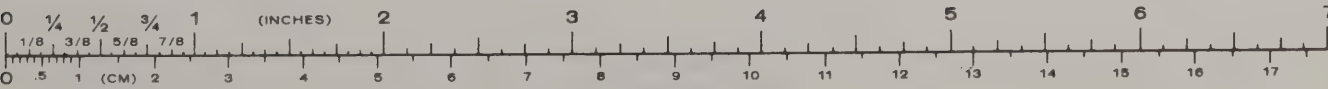
B4	✓ 230-5857	1	Pushbutton switch	SW5
	230-5848	1	Switch circuit board	
		✓	Solder	

PRINTED MATERIAL*

C1		1	Blue and white label	
C2	390-2941	1	Fuse replacement label	
C3	390-2973	1	Power consumption label	
	597-260	✓ 1	Parts Order Form	
		1	Assembly Manual (see Page 1 for part number)	

PART IN FINAL PACK

✓	230-5847	1	LED indicator circuit board (attached to main circuit board)	
---	----------	---	--	--



STEP-BY-STEP ASSEMBLY

LED INDICATOR CIRCUIT BOARD

Refer to Pictorial 1-1 for the following steps.

- () Locate the main circuit board. Then refer to Detail 1-1A and carefully snap the LED indicator circuit board from it along the perforated edge. Set the main circuit board aside until it is called for later.

In the following steps, you will be given detailed instructions on how to install and solder the first component on the circuit board. Read and perform each step carefully. Then use the same procedure to install the remaining components on the circuit board.

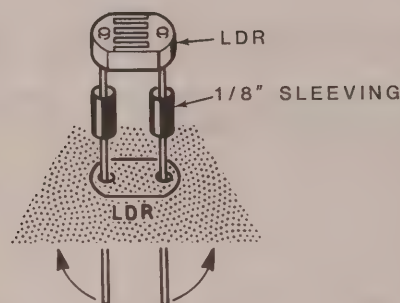
Note that the circuit board has foil patterns on one side and the other side has outlines of components (parts) shown on it. The "foil" side of the board will be referred to as such, and the side with the outlines will be called the "component" side of the board.

- (X) Position the circuit board as shown in the Pictorial with the component side facing up.

- (X) Cut a 1/4" piece of sleeving in half to form two 1/8" pieces.

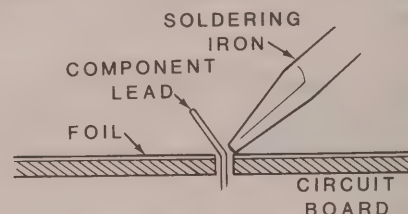
- (X) Locate the first component, a light dependent resistor, and hold it by the body. Slide a 1/8" piece of small sleeving over each of the leads.

- (X) LDR: Insert the light dependent resistor leads into the circuit board holes at LDR and press the sleeving against the board. Bend the leads out slightly to hold the component in place as shown.

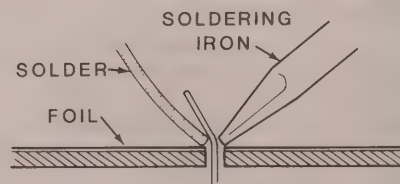


Solder the leads to the circuit board as follows:

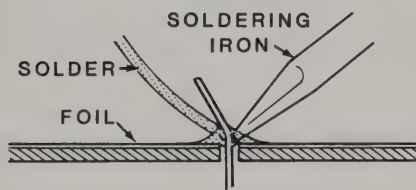
1. Push the soldering iron tip against one of the light dependent resistor leads and the circuit board foil. Heat **both** for two or three seconds. **DO NOT** apply more heat than necessary or you could damage the part.



2. Apply solder to the other side of the connection. **IMPORTANT:** Let the heated lead and the circuit board foil melt the solder.



3. As the solder begins to melt, allow it to flow around the connection. Remove the solder and the iron and let the connection cool; then cut off the excess lead lengths.



- ✓ Check each solder connection and compare it to Detail 1-2A. After you have checked the connections, proceed with the assembly. Use the same soldering procedure for each component.

IMPORTANT: Make sure you installed the first component on Page 8 before you proceed.

- ✓ Position the **shorter** lead of the red LED toward the banded end of the diode outline at RD and insert the leads into the circuit board holes. Press the LED body against the circuit board and bend the leads out slightly to hold the part in place.

- ✓ Similarly, install the green LED at GN with the shorter lead toward the banded end of the diode outline.

- ✓ Solder the leads to the foil and cut off the excess lead lengths.

- ✓ Insert the five wires at either end of the 5-wire ribbon cable into the circuit board holes at ASSY 1. Solder the wires to the foil and cut off the excess wire lengths.

- ✓ Make sure that each of the LEDs are flat against the circuit board and perpendicular to it. Also, make sure that the light dependent resistor body is against the sleeving and perpendicular to the board. Check the solder connections, re-heating any doubtful connections; then set the LED indicator circuit board assembly aside.

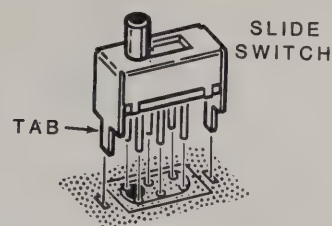
SWITCH CIRCUIT BOARD

Refer to Pictorial 1-2 for the following steps.

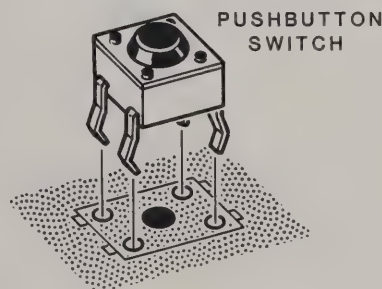
- ✓ Position the switch circuit board as shown.

NOTE: You can install the slide switch, which you will install in the next step, in either direction.

- ✓ SW4: Insert the pins and tabs of the slide switch into their circuit board holes. Turn the board over and bend the tabs against the circuit board. Solder the pins to the foil. Then refer to the inset drawing in Pictorial 1-2 and solder the indicated tab to the adjacent foil.



- ✓ SW5: Pushbutton switch. Insert the pins into the circuit board holes and press the switch body flat against the board. Solder the pins to the foil.



NOTE: When you are instructed to connect the following wires to the circuit board holes, solder each one to the foil after you connect it and cut off the excess wire length.

- ✓ Connect one end of a 4" white wire to hole AC.

- ✓ Connect one end of the 4" black wire to hole AD.

Connect and solder the wires of the 5-wire cable w/ socket to the circuit board at CNTR 2 as follows. All of the hole numbers are shown in the illustration and not on the circuit board:

(X) Green wire to hole 1.

(X) Yellow wire to hole 2.

(X) Orange wire to hole 3.

(X) Red wire to hole 4.

(X) Brown wire to hole 5.

(X) Recheck each solder connection to make sure they are secure. Then set the switch circuit board assembly aside until it is called for later. Also set the remaining wire and sleeving aside for use later.

MAIN CIRCUIT BOARD

PARTS LIST

Remove the parts from Pack 2 and check each part against the following list. The key numbers correspond to the numbers on the "Main Circuit Board Parts Pictorial." Do not remove components that are supplied on a tape from the tape until you use them in a step. Return any part that is in an individual envelope back into the envelope after you have identified it until that part is called for in a step. Do not throw away any packing material until you account for all the parts.

To order a replacement part, always include the **PART NUMBER**. Use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of this Manual.

A replacement part may look slightly different than the original part, or may have different printing on it. In any case, the performance of the replacement part will meet or exceed the requirements of the original part. For example: A 15-volt capacitor (10 μ F, 15V) may be replaced with a 25-volt capacitor (10 μ F, 25V).

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

CAPACITORS

Mylar

A1	21-140	1	.001 μ F	C4
A1	230-5822	1	.0068 μ F	C1
A1	27-161	1	.01 μ F (103)	C2
A1	27-145	1	.22 μ F (224)	C5

Electrolytic

A2	25-948	1	100 μ F	C7
A2	25-887	1	220 μ F	C3
A2	25-905	1	470 μ F	C6

TRANSISTORS - INTEGRATED CIRCUITS (ICs)

NOTE: Transistors and integrated circuits may be marked for identification in any one of the following four ways:

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
---------	----------------	------	-------------	-------------------

1. Part number.
2. Type number. (This refers only to the numbers and letters shown in **BOLD** print. Disregard any other numbers or letters.)
3. Part number and type number.
4. Part number with a type number other than the one shown.

B1	230-5865	3	2SC 536 F or 2SX 1815 G transistor	Q1, Q2, Q3
B1	230-5864	1	2SA 1246 T/U or 2SA 1318 T/U	Q4
B2	230-5866	1	2SD 400 F	Q5

CAUTION: The integrated circuit can be damaged by static electricity. DO NOT remove the IC from its conductive package until you are instructed to do so.

B3	230-5863	1	LM8363 IC	IC1
----	----------	---	-----------	-----

KEY No.	HEATH Part No.	QTY.	DESCRIPTION
------------	-------------------	------	-------------

SWITCHES

C1	230-5854	1	3-position slide switch
C2	230-5853	1	2-position slide switch
C3	230-5856	2	Pushbutton switch

WIRES

D1	230-5825	2	3/16" jumper
D2	230-5826	9	3/8" jumper

CIRCUIT Comp. No.

SW3
SW6
SW1, SW2

KEY No.	HEATH Part No.
------------	-------------------

PLUG - SOCKET - CONNECTOR - PIN

E1	230-5867	1	5-pin plug
E2	230-5831	1	42-pin IC socket
E3	230-5869	1	34-wire connector
E4	230-5875	2	Pin

CIRCUIT Comp. No.

MISCELLANEOUS

	230-5847	1	Main circuit board	
F1	230-5861	1	LED display LTC-755A1G-24	T1
F2	230-5830	1	Power transformer	
F4	230-5838	1	Display bracket	
F5	230-5881	2	Fuse clip	
F6	230-5872	2	.05-ampere fuse (includes one extra)	F1
F7	810-9	3	M3 - .5 x 6mm machine screw	
F8	230-5845	1	Hrs/mins pushbutton	

TAPED COMPONENTS

The remaining parts are supplied on taped strips. It is not necessary to check them against the following list.

HEATH Part No.	QTY.	DESCRIPTION
-------------------	------	-------------

RESISTORS

All 5% resistors have four color bands (last band gold). 2% resistors have a red fourth band. The last band is a tolerance band and will not be called out.

All 1% resistors have five color bands (last band brown). The brown tolerance band is set apart from the other bands and will not be called out.

All resistors are rated at 1/4-watt.

6-479-12	2	4.7 Ω (yel-viol-gld)	R18, R21
6-100-12	2	10 Ω (brn-blk-blk)	R4, R19
6-201-12	1	200 Ω (red-blk-brn)	R7
6-221-12	3	220 Ω (red-red-brn)	R9, R10, R20
6-471-12	1	470 Ω (yel-viol-brn)	R3
6-122-12	1	1200 Ω (brn-red-red)	R11

HEATH Part No.	QTY.	DESCRIPTION
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6-222-12	1	2200 Ω (red-red-red)	R12
6-103-12	2	10 kΩ (brn-blk-org)	R8, R14
6-223-12	2	22 kΩ (red-red-org)	R15, R16
6-563-12	1	56 kΩ (grn-blu-org)	R17
6-823-12	1	82 kΩ (gry-red-org)	R13
6-104-12	1	100 kΩ (brn-blk-yel)	R1
230-5813	1	124 kΩ, 1% (brn-red-yel-org)	R2
6-224-12	1	220 kΩ (red-red-yel)	R5
6-334-12	1	330 kΩ (org-org-yel)	R6

DIODES

57-65	5	1N4001	D2, D3, D4, D5, D8
56-28	3	1N4148	D1, D6, D7

STEP-BY-STEP ASSEMBLY

Refer to Pictorial 2-1 as you read the following Notes.

NOTES:

1. Pictorial 2-1, is divided into sections. You will be working on each of these sections in a specific series of steps.
 2. In each series of steps, you will install parts in a top-to-bottom, left-to-right sequence. Occasionally, you may be directed to install a part out of sequence.
 3. Check off each step as you perform it. You may also wish to place a check mark near each component on the Pictorial as you install it.
 4. In general, solder instructions are given only at the end of a series of similar steps; you may solder more often if you wish.
- (X) Position the circuit board as shown in the Pictorial with the component side up. Always install components on the component side of the circuit board and solder the leads to the foil on the other side.
- () Cut the "Taped Components Chart" from the last page in the Illustration Booklet. Make sure you read the instructions at the top of the chart before you use it. Note that it is divided into numbered sections which correspond to the numbered sections on the circuit board pictorial.

IMPORTANT: The components are in assembly sequence. Make sure that you do not install a component out-of-sequence; otherwise, the remaining components could also be out-of-sequence.

Section 1

NOTE: When you install an axial-lead component, such as the following resistor, hold the component by the body and bend the leads straight down with your finger to fit the circuit board hole spacing. Then insert the leads into the circuit board holes and press the body against the board. Bend the leads out slightly to hold the component in place.

(X) R3: 470 Ω (yel-viol-brn) resistor.

(X) R8: 10 k Ω (brn-blk-org) resistor.

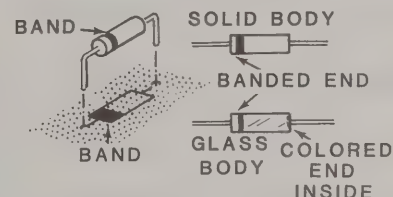
() R6: 330 k Ω (org-org-yel) resistor.

(X) R5: 220 k Ω (red-red-yel) resistor.

(X) J3: 3/8" jumper wire.

NOTE: When you install a diode, always match the band on the diode with the band shown on the circuit board. **The circuit will not work properly if a diode is installed backwards.**

If your diode has a solid body, the band is clearly defined. If your diode has a glass body, do not mistake the colored end inside the diode for the banded end. Look for a band painted on the outside of the glass.



CAUTION: ALWAYS POSITION THE BANDED END OF A DIODE AS SHOWN ON THE CIRCUIT BOARD.

☒ D5: 1N4001 diode (#57-65).

☒ D1: 1N4148 diode (#56-28).

☒ D8: 1N4001 diode (#57-65).

☒ J1: 3/8" jumper wire.

☒ J2: 3/8" jumper wire.

☒ Solder the leads to the foil and cut off the excess lead lengths.

☒ R12: 2200 Ω (red-red-red) resistor.

☒ R13: 82 k Ω (gry-red-org) resistor.

☒ R17: 56 k Ω (grn-blu-org) resistor.

☒ Solder the leads to the foil and cut off the excess lead lengths.

NOTE: You can wire your alarm clock to display in a 12-hour or 24-hour format. If you prefer the 12-hour format, refer to "12-Hour Wiring." Refer to "24-Hour Wiring" if you prefer a 24-hour display format.

Section 2

☒ D2: 1N4001 diode (#57-65).

☒ R1: 100 k Ω (brn-blk-yel) resistor.

☒ D3: 1N4001 diode (#57-65).

☒ D4: 1N4001 diode (#57-65).

☒ R9: 220 Ω (red-red-brn) resistor.

☒ R2: 124 k Ω , 1% (brn-red-yel-org) resistor.

☒ Solder the leads to the foil and cut off the excess lead lengths.

12-HOUR WIRING

Refer to Pictorial 2-2 Part A for the following steps.

☐ R11: 1200 Ω (brn-red-red) resistor.

☐ R14: 10 k Ω (brn-blk-org) resistor.

☐ D6: 1N4148 diode (#56-28).

☐ R4: 10 Ω (brn-blk-blk) resistor.

☐ Install a 3/8" jumper wire at holes N and O.

☐ R10: 220 Ω (red-red-brn) resistor.

☐ Install a 3/16" jumper wire at holes AA and AB. NOTE: You will have to reform this wire to fit the hole spacing.

☐ Install a 3/16" jumper wire at holes Y and Z. NOTE: You will have to reform this wire to fit the hole spacing.

☐ D7: 1N4148 diode (#56-28).

☐ Solder the leads to the foil and cut off the excess lead lengths.

This completes the "12-Hour Wiring." Proceed to "Alternate Line Voltage Wiring."

Section 3

☒ R7: 200 Ω (red-blk-brn) resistor.

☒ R15: 22 k Ω (red-red-org) resistor.

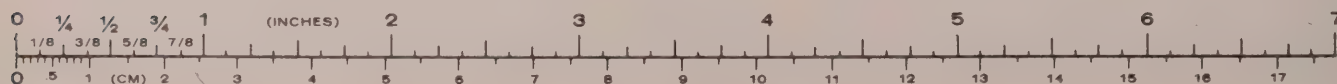
☒ R16: 22 k Ω (red-red-org) resistor.

☒ R18: 4.7 Ω (yel-viol-gld) resistor.

☒ R19: 10 Ω (brn-blk-blk) resistor.

☒ R21: 4.7 Ω (yel-viol-gld) resistor.

☒ R20: 220 Ω (red-red-brn) resistor.



24-HOUR WIRING

Refer to Pictorial 2-2 Part B for the following steps.

- ☒ Connect a 3/8" jumper wire at holes V and W.
- ☒ Connect a 3/8" jumper wire at holes T and U.
- ☒ Connect a 3/8" jumper wire at holes R and S.
- ☒ Connect a 3/8" jumper wire at holes X and Z.
NOTE: You will have to reform this wire to fit the hole spacing.
- ☒ Solder the wires to the foil and cut off the excess wire lengths.

This completes the "24-Hour Wiring."

ALTERNATE LINE VOLTAGE WIRING

Two sets of line voltage wiring instructions are given below, one for 120 VAC line voltage and the other for 240 VAC line voltage. In the U.S.A., 120 VAC is most often used, while in other countries, 240 VAC is most common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.

120 VAC

Refer to Pictorial 2-3 Part A for the following steps.

NOTE: When you are instructed to prepare a wire, as in the following step, cut it to the indicated length and remove 1/4" of insulation from each end. When you install a white jumper wire, bend the 1/4" bare wire ends down 90° and insert them into the circuit board holes at the indicated location. Bend the wire ends out slightly to hold the wire in place.

- ☒ Cut two 1" white wires and prepare the ends.
- ☒ Connect a 1" white wire at holes C and E.
- ☒ Connect a 1" white wire at holes D and F.
- ☒ Solder the wires to the foil and cut off the excess wire lengths.

This completes the "120 VAC" wiring. Proceed to "Alternate Line Frequency Wiring."

240 VAC

Refer to Pictorial 2-3 Part B for the following step.

NOTE: When you are instructed to prepare a wire, as in the following step, cut it to the indicated length and remove 1/4" of insulation from each end. When you install the white jumper wire, bend the 1/4" bare wire ends down 90° and insert them into the circuit board holes at the indicated location. Bend the wire ends out slightly to hold the wire in place.

- ☐ Cut a 3/4" white wire and prepare the ends.
- ☐ Connect a 3/4" white wire at holes D and E.
- ☐ Solder the wire to the foil and cut off the excess wire lengths.

This completes the "240 VAC" wiring.

ALTERNATE LINE FREQUENCY WIRING

Two sets of line frequency wiring instructions are given below, one for 50 Hz line frequency and the other for 60 Hz line frequency. In the U.S.A., 60 Hz is most often used, while in other countries, 50 Hz is most common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE FREQUENCY IN YOUR AREA.

50 Hz Wiring

- ☒ Refer to Pictorial 2-4 and connect a 3/8" jumper wire at holes P and Q.

This completes the "50 Hz Wiring." Proceed to "Main Circuit Board Assembly (continued)."

60 Hz Wiring

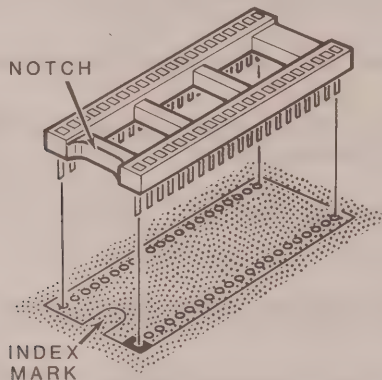
- ☒ Refer to Pictorial 2-4 and connect a 3/8" jumper wire at holes L and M.

This completes the "60 Hz Wiring."

MAIN CIRCUIT BOARD ASSEMBLY (continued)

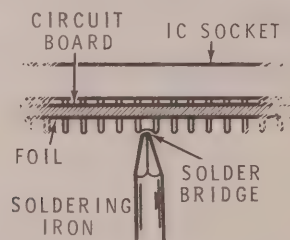
Refer to Pictorial 2-5 for the following steps.

NOTE: Before you install an IC socket, make sure the pins are straight. If there is any kind of identification mark (notch, dot, arrowhead, etc.) at or near one end of the socket, place this marked end toward the index mark on the circuit board (this index mark should still be visible after you install the socket). Then start the pins into the circuit board holes.



Hold the socket in place while you turn the board over and lay it on top of the socket on your work surface. The board will hold the socket in place. At first, solder only two pins at diagonally opposite corners of the socket. When the solder cools, check to make sure the socket is tight against the circuit board. If not, reheat the pins while you press against the socket to reseal it. Then solder the remaining pins to the foil.

NOTE: A solder bridge may occur when you make solder connections at closely spaced foils. Therefore, after each solder step, carefully inspect the foil for solder bridges and remove any that have formed. To remove a solder bridge, hold the circuit board foil-side-down as shown, and hold the soldering iron tip between the two points that are bridged. The solder will flow down the soldering iron tip to clear the bridge.

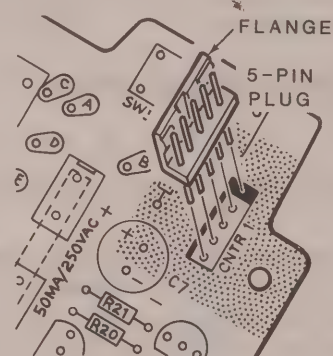


(X) IC 1: 42-pin IC socket.

NOTE: If you wired your clock for the 24-hour display, perform the following step. Otherwise, skip the step. This resistor is indicated on the Taped Components Chart.

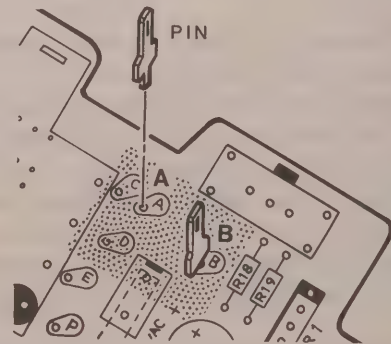
(X) Connect a 220 Ω (red-red-brn) resistor vertically to holes AA and AB as shown in the inset drawing.

NOTE: When you install the following plug, position it with the flange over the dark line as shown. Insert the pins into the circuit board holes and press the body against the board. Solder the pins to the foil.



(X) CNTR 1: 5-pin plug.

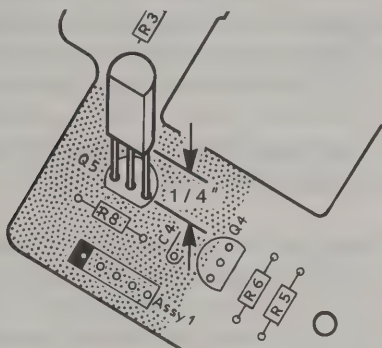
(X) Install a pin at hole A as shown and solder it to the foil.



(X) Similarly install a pin at hole B and solder it to the foil.

Heathkit®

NOTE: Whenever you install a transistor, as in the following step, position it so the flat side is over the flat of the outline on the circuit board, as shown. Then insert the leads into their circuit board holes and position the bottom of the case $1/4"$ above the board. Bend the transistor leads out slightly on the foil side of the board to hold it in place. Solder the leads to the foil and cut off the excess lead lengths.



Q5: 2SD400 transistor.

Q4: 2SA1246T/U or 2SA1318T/U transistor.

NOTE: If you have wired your alarm clock for the 12-hour display mode, perform the next step. Otherwise, skip the step.

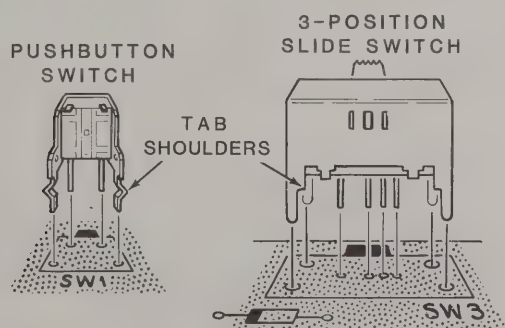
~~Q3: 2SC536F or 2SC1815G transistor.~~

Q1: 2SC536F or 2SC1815G transistor.

Q2: 2SC536F or 2SC1815G transistor.

Solder the leads to the foil and cut off the excess lead lengths.

NOTE: When you install the following switches, insert the pins into the circuit board holes and press the pin shoulders against the circuit board. Solder the pins to the foil.



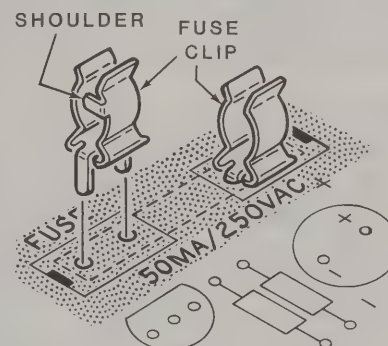
SW1: Pushbutton switch.

SW2: Pushbutton switch.

SW3: 3-position slide switch.

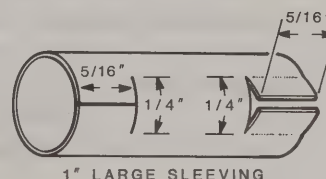
SW6: 2-position slide switch.

Position a fuse clip with the shoulder facing as shown and insert the tabs into the circuit board holes at top FUSE location. Position the clip perpendicular to the board and solder it to the foil.

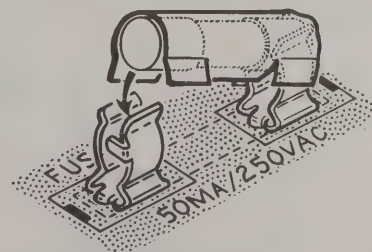


Similarly install the other fuse clip with the shoulder as shown at the lower FUSE location. Align the fuse clip with the other one and solder it to the foil.

Cut $5/16"$ slits in each end of the 1" large sleeving as shown.



F1: Slide the 1" large sleeving over the .05-ampere fuse and install the fuse into the fuse clips. Make sure the sleeving covers the fuse clips.

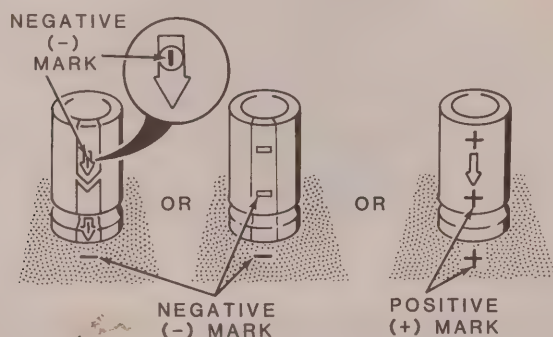


Refer to Pictorial 2-6 for the following steps.

(X) C4: .001 μ F Mylar capacitor.

(X) C2: .01 μ F (103) Mylar capacitor.

NOTE: Before you install an electrolytic capacitor, look at it and identify the leads. One lead will have either a negative (-) mark or a positive (+) mark near it on the side of the capacitor. (The marking for a negative lead may look like an oblong bar, sometimes with a circle around it, inside an arrow.) . . . Be sure to install the negative lead in the negative-marked hole, and the positive lead in the positive-marked hole.



(X) C3: 220 μ F electrolytic capacitor.

(X) C6: 470 μ F electrolytic capacitor.

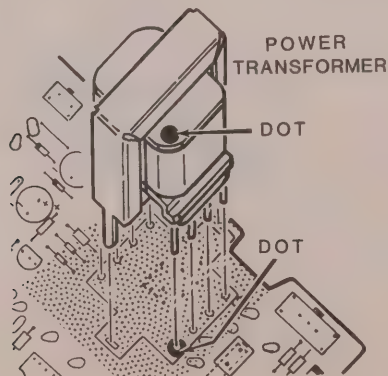
(X) C1: .0068 μ F Mylar capacitor.

(X) C7: 100 μ F electrolytic capacitor.

() C5: .22 μ F (224) Mylar capacitor.

(X) Solder the leads to the foil and cut off the excess lead lengths.

(X) T1: Power transformer. Position the transformer with the dot over the dot shown on the circuit board. Then insert the pins and tabs into their holes until the body is against the circuit board and solder the pins and tabs to the foil.



NOTE: During the following steps, you will be working with the display board first, and then with the main board.

() Straighten the wires on the 34-wire connector. Then insert one side of the connector wires into the display circuit board holes and press the connector body against the board. Position the soldering iron toward the outside of the display and carefully solder the end wires to the foil. Check to make sure the wire connector body is still against the board; then solder the remaining wires and cut off the excess wire lengths. Be careful not to burn the display with your soldering iron.

(X) Refer to Detail 2-6A and, on the remaining side of the wire connector, cut the wires on a slant to the indicated lengths with a pair of scissors. This will make installation into the main circuit board easier.

(X) Refer to Part A of Detail 2-6A and, starting with the longer LED display wires, insert the thirty-four wires into the main circuit board holes. Then bend the display over sharply so it is perpendicular to and against the main circuit board.

(X) Refer to Part B of Detail 2-6A and mount the bracket to the main circuit board and the LED display with two M3 - .5 \times 6 mm. machine screws.

(X) Carefully solder the display wires to the foil and cut off the excess wire lengths. Check to make sure there are no solder bridges between the foil pads.

(X) Peel the thin plastic film from the display face.

(X) Refer to Detail 2-6C and mount the hrs/mins pushbutton to the main circuit board with a M3-.5 \times 6 mm machine screw. Space the pushbuttons equal distances from the switch buttons as you tighten the screw.

(X) Match the wire 1 end of the 5-wire ribbon cable coming from the LED indicator circuit board with the wire 1 end at ASSY 1 on the main circuit board. Then insert the wires into the board holes, solder the wires to the foil, and cut off the excess wire lengths.

CIRCUIT BOARD CHECKOUT

Carefully inspect the circuit board for the following possible problems:

- (X) Unsoldered connections.
- (X) Poor solder connections.
- (X) Solder bridges between foil patterns. NOTE: Refer to the "X-Ray Views" if you are uncertain and want to see the correct foil patterns.
- (X) Protruding leads which could touch together when the circuit board is mounted later.

Refer to the illustrations where the parts were installed as you make the following visual checks:

- (X) Transistors for the proper type and installation.
- (X) Diodes for the proper type and positioning of the banded end.
- (X) Electrolytic capacitors for the correct position of the positive (+) or negative (−) markings.

IC INSTALLATION

Refer to Pictorial 2-6 for the following step.

CAUTION: Integrated circuits (ICs) are complex electrical devices that perform many complicated operations in a circuit. These devices can be damaged during installation. Read all of the following information before you install the ICs.

The IC you will install in the following step is a MOS (metal oxide semiconductor) device; it has been shipped in a special pad to protect it from static electricity. Once you remove the IC from the pad, do not let go of it or lay it down until it is installed in its socket.

Install the IC as shown in Detail 2-6D. When you bend the leads, as described in the Detail, hold the IC in one hand and place your other hand on your work surface before you touch the IC to it. This will equalize the static electricity between the work surface and the IC.

(X) IC1: LM8363 IC.

(X) Check the IC for the proper position of the pin 1 end, and be sure that all pins are installed properly in their socket holes.

This completes the main circuit board assembly. Set it aside until it is called for. If you wired your clock for 24-hour indication, you will have three resistors, two diodes, and one transistor leftover. Save these in case you ever wish to convert your Clock for 12-hour indication. Also, save the extra fuse in case you should need it.

CABINET

PARTS LIST

Remove the remaining parts from the carton and check each part against the following list. The key numbers correspond to the numbers on the "Cabinet Parts Pictorial." Return any part that is in an individual envelope back into the envelope after you have identified it, until that part is called for in a step. Do not throw away any packing material until you account for all the parts.

To order a replacement part, always include the **PART NUMBER**. Use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of this Manual.

A replacement part may look slightly different than the original part, or may have different printing on it. In any case, the performance of the replacement part will meet or exceed the requirements of the original part. For example: A 15-volt capacitor (10 uF, 15V) may be replaced with a 25-volt capacitor (10 uF, 25V).

KEY No.	HEATH Part No.	QTY.	DESCRIPTION
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PLASTIC PARTS

A1	230-5832	1	Cabinet top
A2	230-5833	1	Cabinet bottom
A3	230-5834	1	Battery cover
A4	230-5835	1	Bezel
A5	230-5843	1	Window
A6	230-5844	1	Snooze pushbutton

HARDWARE

B1	230-5850	7	M3 × 6 mm self-tapping screw
B2	810-9	1	M3 - .5 × 6 mm machine screw
B3	230-5851	6	M3 × 8 mm self-tapping screw
B4	230-5852	4	M3 × 10 mm self-tapping screw
B5	230-5846	1	Fiber washer

CIRCUIT Comp. No.

KEY No.	HEATH Part No.	QTY.	DESCRIPTION
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MISCELLANEOUS

C1	230-5839	1	Round felt switch cover
C2	230-5878	2	Rectangular switch cover
C3	230-5837	3	Bracket
C4	230-5840	1	Foam pad
C5	230-5841	2	Spring
C6	230-5842	4	Rubber foot
C7	401-176	1	Speaker
C8	432-798	1	Battery connector
C9	230-5827	1	Line cord
C10	230-5836	1	Function label

CIRCUIT Comp. No.

STEP-BY-STEP ASSEMBLY

- (X) Refer to Pictorial 3-1 and position the cabinet bottom with the bottom side facing up. Insert a rubber foot into each of the four cabinet bottom mounting holes, then pull each foot into the cabinet hole with a pair of pliers until it seats into the groove.

Refer to Pictorial 3-2 for the following steps.

- (X) Position the cabinet bottom in its upright position.
- (X) Wrap the line cord around the boss in the case bottom so there is approximately 4" between the two insulated socket pin ends and the case. Then secure the line cord with a fiber washer and a M3 × 8mm self-tapping screw. Route the plug end of the line cord out through the case bottom rear slot.
- (X) Insert the red and black wires of the battery connector through the case bottom at hole A.
- (X) Position the main circuit board near the cabinet bottom and route the red and black battery connector wires up through the main circuit board cutout from the foil side. Then solder the red battery connector wire to circuit board hole J and the black wire to hole K. Cut off the excess wire lengths.

Refer to Pictorial 3-3 for the following steps.

- (X) Place the main circuit board inside the cabinet bottom.
- (X) Plug the ribbed line cord lead connector over circuit board pin A and the smooth lead connector over pin B.
- (X) Slide rectangular switch covers over switches SW3 and SW6.

- (X) Mount the main circuit board to the cabinet bottom with five M3 × 8mm self-tapping screws. Be careful not to pinch the battery connector wires and route the line cord as shown.

- () Remove the plastic film from both sides of the window and the two paper backing strips from the back of the window. Position the window and the bezel as shown and press the window onto the bezel.

- (X) Use a soft cloth to clean any fingerprints or smudges from the LED display. Insert the three bezel tabs into the cabinet bottom slots until they lock into place.

- (X) Mount the LED indicator circuit board to the bezel with a M3 - .5 × 6mm machine screw.

Set the cabinet bottom assembly aside.

Refer to Pictorial 3-4 for the following steps.

- (X) Position the cabinet top as shown.
- (X) Refer to Detail 3-4A and slide the round felt switch cover over the slide switch knob until it is against the switch body.
- (X) Route the switch circuit board wires as shown and mount the board to the cabinet top with four M3 × 6mm self-tapping screws.
- (X) Position the speaker in the cabinet top with the terminals positioned as shown. Then secure the speaker with three clips and three M3 × 6mm self-tapping screws. Position the clips through the clip holders as shown.
- (X) Connect and solder the free end of the black wire coming from the switch circuit board to the negative (-) speaker terminal.

- (X) Connect and solder the free end of the white wire coming from the switch circuit board to the positive (+) speaker terminal.
- (X) Turn the cabinet top over.
- (X) Refer to Detail 3-4B and, if present remove the clear film from the face of the function label. Then remove the paper backing from the adhesive side of the label. Carefully align the edges of the label with the recessed edges in the cabinet top as shown; then press the label into place.
- (X) Refer to Detail 3-4B, position the two springs as shown and slide them over the snooze pushbutton bosses. Then insert the pushbutton tabs into the cabinet top slots.

Refer to Pictorial 3-5 for the following steps.

- (X) Write the following information on the fuse replacement label: “.05-ampere, 250 V, 5 × 20 mm.”
- (X) Remove the backing from the fuse replacement label and press it onto the inside of the cabinet top at the indicated location.

- (X) Position the cabinet top near the cabinet bottom and install the 5-hole socket coming from the switch circuit board over the 5-pin plug at CNTR 1 on the main circuit board. The socket and plug are polarized to fit only one way.
- (X) Place the cabinet top onto the cabinet bottom. You will install the hardware later.
- (X) Carefully turn the cabinet over so the bottom faces up.

Refer to Detail 3-5A for the next two steps.

- (X) Remove the backing from the power consumption label and press the label on the cabinet bottom at the indicated location. Do not cover the vent holes.
- (X) Similarly install the blue and white label on the cabinet bottom at the indicated location.
- (X) Position the cabinet in its upright position.

This completes the Clock assembly. You will install the battery in the Operation section of your Manual. NOTE: You will have several parts left over, depending upon the wiring procedures you used. You may wish to keep these in case they are ever needed. Put them in a safe place, then proceed to “Initial Tests.”

INITIAL TESTS

Refer to Pictorial 4-1 for the following steps.

RESISTANCE CHECKS

You will need a VOM (volt-ohmmeter), VTVM (vacuum tube voltmeter), or DMM (digital multimeter) for the following checks. If you do not have a meter, carefully recheck the circuit board connections, and then proceed to "Operational Checks."

The ohmmeter for the resistance checks should have sufficient test voltage to forward bias semiconductor junctions. The voltmeter section of the meter should have at least a 10 M Ω input impedance.

- () Position the unit as shown.
- () Connect your ohmmeter common (ground) lead to jumper wire J3.

NOTE: If you do not obtain the correct results during any of the test steps, proceed to "In Case of Difficulty" on Page 27. Do not proceed with any further testing until you have corrected the problem.

- () Set the ohmmeter range switch to R \times 10.
- () Touch the positive ohmmeter lead to one line cord prong and then the other prong. Both readings should measure infinity (∞).
- () Connect the common ohmmeter lead to one line cord prong and the positive lead to the other prong. The reading should measure between 180 and 200 ohms for 120 VAC wired units, and between 750 and 770 ohms for 240 VAC units.
- () Disconnect the ohmmeter leads and set the ohmmeter aside.

OPERATIONAL CHECKS

- () Make sure the ALARM switch is in the OFF position.
- () Set the ALARM/RUN/SET TIME switch to SET TIME.
- () Plug the line cord into an AC wall outlet. The display should light and the numbers should blink on and off in unison.
- () Press the HOURS pushbutton until the hours display counts from 1 to 12 or from 1 to 24, depending upon how you wired your clock. Make sure each display segment lights properly. If your clock is wired for the 12-hour mode of operation, allow the hours to cycle twice and check to make sure that the green PM LED lights when the hours display is in that mode of operation; then release the HOURS pushbutton.
- () Press the MINUTE pushbutton until the minute displays count from 01 through 00. Make sure all of the display segments light, then release the pushbutton. You will set the time in the Operation section.
- () Position the ALARM switch to on and the red LED should light.
- () Switch the Clock to SET ALARM and set the time to 8:05 AM.
- () Switch the Clock to SET TIME and set the time to 8:03 AM.
- () Switch the Clock to RUN; the alarm should sound two minutes later.

- () Press and hold the SNOOZE/CALENDAR pushbutton. If your clock is wired for the 12-hour mode of operation, the display should register "12: 1" (month:date), or the reverse (date:month) if your clock is wired for the 24-hour display mode. You will set the date in the Operation section.
- () Place your hand in front of the light dependent resistor and the display should dim.

- () Disconnect the line cord from the wall outlet.
- () Carefully place the cabinet top on the cabinet bottom so the mounting holes align and secure the cabinet halves with four M3 × 10 mm self-tapping screws. Make sure that you do not pinch any wires between the cabinet halves.

This completes the "Initial Tests." Proceed to "Operation" to set your Clock.

OPERATION

BATTERY INSTALLATION

Refer to Pictorial 5-1 for the following steps.

- () Position the cabinet upside down on your work surface.
- () Connect the battery connector to the 9-volt battery and insert the battery into its cabinet compartment. Push the excess wiring inside the case through the hole.
- () Remove the paper backing from the foam pad. To help you do this, carefully stretch the foam pad until the paper backing tears slightly, then peel the piece of backing from the pad. Apply the foam pad to the battery cover at its center.
- () Insert the battery cover tabs under the case and press down on the cover to snap it into place in the cabinet bottom.
- () Reposition the cabinet to its upright position with the front facing you.

CONTROL FUNCTIONS

Refer to Pictorial 5-2 for the location of the following controls.

1. **Alarm On/Off switch** — Turns the alarm on and off. When the alarm sounds, use this switch to turn it off. When you return this switch to the On position, it sets the alarm for the next 24-hour period. NOTE: If you wired your Clock for 12-hour operation, the alarm will beep; if you wired it for 24-hour operation, the alarm will sound continuously. The alarm will not sound during power interruptions.
2. **Alarm Hi/Lo switch** — Selects one of two sound levels.
3. **Snooze/Calendar switch** — This is a dual function pushbutton. If you press it while the alarm sounds, it will reset the alarm to go off again in approximately 9-minutes. You can repeat this as often as you desire.

You can also display the calendar at any time by simply pressing this switch. If your Clock is wired for the 12-hour mode, the calendar will display numerically the month and then the date, (e.g. 12: 1). In the 24-hour mode, the display will show the date and then the month (e.g. 1 :12).
4. **Set Alarm/Run/Set Time switch** — Used in conjunction with the Hour and Minute pushbuttons for setting the alarm and time of day. Use it as follows:
 - In the Set Alarm position, the time that the alarm is set to activate will be displayed, and you can reset it using the HOURS and MINUTES pushbuttons. The time of day will continue to operate even though it is not displayed.
 - In the Set Time position, the time of day will be displayed, and you can set it using the HOURS and MINUTES pushbuttons, as desired.
 - In the Run position, the Clock will display the time of day. You cannot set the alarm time or time of day in the Run position.
5. **Minute and Hour pushbuttons** — Press these buttons to advance the minutes and hours display when the Set Alarm/Run/Set Time switch is in either the Set Alarm or Set Time position.
6. **Alarm LED (red)** — Lights whenever the ALARM switch is on.

7. **PM LED (green)** — Lights to indicate the afternoon portion of the day. This LED lights only if the Clock is wired for 12-hour display operation. It also lights whenever you set the alarm.
8. **Hours and Minutes display** — Indicates the hours and minutes of the time of day or the time you have the alarm set to activate.
9. **Colon** — The colon will flash from dim to bright at a one-second rate if the Clock is wired for 12-hour operation. If the Clock is wired for 24-hour operation, the colon will remain on steady.
10. **Light Dependent Resistor** — Varies the brightness of the display, Alarm, and PM LEDs in direct proportion to the room's ambient light. For example, in a brightly lit room the display will be at its maximum brightness, and in a darkened room it will be at its minimum brightness.

SETTING THE TIME OF DAY

1. Slide the Set Alarm/Run/Set Time switch to Set Time.
2. Press and hold the Hour pushbutton while you observe the display. When the hour digit(s) indicate(s) the proper hour, release the button. If appropriate, allow the clock to cycle until PM indicator lights.
3. Press and hold the Minute pushbutton while you observe the display. When the minute digits indicate the proper time, release the button.
4. Slide the Set Alarm/Run/Set Time switch to Run.

SETTING THE ALARM

1. Slide the Set Alarm/Run/Set Time switch to Set Alarm.
2. Press and hold the Hour pushbutton while you observe the display. When the hour digit(s) indicate(s) the proper hour, release the button. Make sure that the clock cycles to light the PM indicator if you desire the alarm

to activate during that period. The light should be out if you desire the alarm to activate during the AM portion of the day.

3. Press and hold the Minute pushbutton while you observe the display. When the minute digits indicate the proper time, release the button.
4. Slide the Set Alarm/Run/Set Time switch to Run.
5. Slide the ALARM switch to On to turn the alarm on. The red Alarm indicator will light.

SETTING THE CALENDAR

1. Slide the Set Alarm/Run/Set Time switch to Set Time.
2. Depress and hold the Snooze/Calendar pushbutton on top of the Clock cabinet.

NOTE: The next two steps describe setting the calendar when the Clock has been wired for a 12-hour display. If your Clock is wired for a 24-hour display, the month:date will be reversed to date:month.

3. Press and hold the Hour pushbutton while you observe the display. When the hour digit(s) changes to indicate the desired month (or date) number, release the button.
4. Press and hold the Minute pushbutton while you observe the display. When the minute digits change to indicate the proper date (or month), release the button.
5. Release the Snooze/Calendar pushbutton.
6. Slide the Set Alarm/Run/Set Time switch to Run.

BATTERY BACKUP SYSTEM CHECK

- () Note the time. Unplug the line cord from the AC outlet and the display should go out. Wait for a few seconds and then plug the line cord back into the AC outlet. The display should light and indicate the proper time.

This completes the "Operation."

IN CASE OF DIFFICULTY

This part of the Manual will help you locate and correct any difficulties which might occur in your Digital Clock. This information is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after the unit is assembled.

The second part, titled "Troubleshooting Chart," is provided to assist you in servicing the Clock if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after your Clock has been in use for some time. The "Troubleshooting Chart" calls out specific problems that may

occur and lists one or more conditions or components that could cause each problem. "Circuit Board X-Ray Views" are also provided in the Illustration Booklet on Page 17 to help you locate the circuit components, and compare foil patterns in case you suspect that a solder bridge exists between the foils.

Try to analyze the symptoms of any problem you might have before you start any troubleshooting procedure. You can usually do this by trying the various functions of your Clock to determine abnormal operations. A review of the "Operation" section may help your analysis.

GENERAL TROUBLESHOOTING INFORMATION

1. About 90% of the kits that are returned for repair do not function properly due to poor connections and soldering. Therefore, you can eliminate many difficulties by carefully inspecting each connection to make sure it is soldered as described in the "Soldering" instructions for the first part on Page 8. Reheat any doubtful connections.
2. Recheck the wiring. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something you have consistently overlooked.
3. Check each circuit board to be sure there are no solder bridges between adjacent connections. If available, a magnifying glass would be helpful for this purpose. Remove any solder bridges by holding a clean, hot soldering iron tip between the two points that are bridged until the excess solder flows down onto the tip. Check the "Circuit Board X-Ray Views" for any questions you may have concerning the foil pattern.

4. Check capacitor values carefully. Be sure the proper value part is installed at each capacitor location and that the positive (+) or negative (–) marks are oriented correctly.
5. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.
6. Check each resistor value carefully. A resistor that is discolored, or cracked, or shows any sign of bulging would indicate that it is damaged and should be replaced. Since damaged resistors are often the result of some other difficulty (such as faulty wiring), you should try to find out what caused the damage before you replace the part.
7. Check all component leads connected to each circuit board. Make sure that none of the leads make contact with other connections or components.

NOTE: If you still cannot locate and correct the trouble after the above tests are completed, and if a voltmeter is available, check your Digital Clock's voltages against the voltages shown on the Schematic Diagram.

WARNING: The full AC line voltage is present at several points and is potentially lethal. Be careful to avoid personal shock when you work on this unit with the power applied.

In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of the Manual. Your Warranty is located inside the front cover.

TROUBLESHOOTING CHART

The following Troubleshooting Chart lists specific difficulties that could occur in your Digital Clock. Several possible causes may be listed for each difficulty. Refer to the "Circuit Board X-Ray Views" and the "Schematic Diagram" to locate and identify the parts listed in this chart.

If a particular part is mentioned (R1 for example) as a possible cause, check that part and other components connected to it to see that they are installed and/or wired correctly. Also check for solder bridges and poor connections in the surrounding area. It is also possible, on rare occasions, for a part to be faulty and require replacement.

PROBLEM	POSSIBLE CAUSE
1. Incorrect readout segments lit.	1. Poor solder connections or solder bridges at IC1, CNTR3. 2. IC1. 3. Display LED. 4. Incorrect jumper wires installed.
2. Time does not advance.	1. Time/Alarm switch in- correctly set at Alarm position. 2. Resistor R1. 3. Integrated circuit IC1. 4. Capacitor C2. 5. Switches SW1 & SW2.
3. Display does not light, or is very dim even in bright room lighting.	1. Diodes D3 & D4. 2. Transistors Q4 & Q5. 3. Light dependent resistor LDR. 4. Resistors R5, R6, & R8.
4. Clock gains time.	1. 50 Hz jumper (P-Q) installed and AC line is 60 Hz.
5. Alarm does not work properly.	1. Transistors Q1, Q2, & Q3. 2. Diodes D1 & D6. 3. Integrated circuit IC1. 4. Switches SW4, SW5, & SW6. 5. Speaker.
6. Display does not dim.	1. Light dependant resistor LDR. 2. LED RD.
7. Alarm-On indicator does not light.	1. Alarm switch SW4. 2. LED RD. 3. Resistor R3.
8. Speaker buzzes.	1. Wire or lead ends in speaker cone. 2. Torn speaker cone.
9. PM indicator does not light.	1. Integrated circuit IC1. 2. LED GRN. 3. Resistor R4.
10. Calendar does not work properly.	1. Integrated circuit IC1. 2. Switch SW5. 3. Incorrect jumper wires installed.
11. Clock is inoperative.	1. Fuse. 2. Jumper wires C-E, D-F. 3. Jumper wire D-E.
12. Battery backup is inoperative.	1. Battery. 2. Diodes D5 & D8.
13. Clock gains time when operating with battery backup. Clock was wired for 50Hz operation.	1. Change capacitor C1 from .0068 μ F to .0082 μ F, 25V. Purchase capacitor locally.

SPECIFICATIONS

Display	Four 7-segment LED digits and colon.
Format	12 or 24 hour.
Accuracy	Determined by the power line frequency.
Alarm	One alarm in a 24-hour period.
Snooze Alarm	Recycles at 9-minute intervals.
Power Requirement	4 watts, 120 or 240 VAC, 50 or 60 Hz.
Dimensions	7-1/8" W × 4-3/8" D × 2-7/8" H (18.1 × 11.1 × 7.3 cm).
Weight	1 lb. 7 oz. (.65 kg).
Calendar	Month and date displayed numerically.
Operating Temperature	0° to 40°C (32° to 104°F).
Battery Standby Life	45 hrs. with alkaline battery.

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

CIRCUIT DESCRIPTION

Refer to the Schematic Diagram (fold-in) as you read the following description.

Integrated circuit IC1 performs all of the time-keeping functions of the clock. The peripheral circuitry consists of the power supply, dimming circuit, alarm circuit, and the display.

The main power supply consists of a full-wave rectifier circuit formed by diodes D3 and D4. Capacitor C6 filters the AC component from the DC voltage. The main supply produces -6.2 VDC and powers the display and alarm circuits. A second supply consists of a half-wave rectifier circuit formed by diode D2 and capacitor C3. It produces -9.1 VDC and powers the oscillator inside IC1. A 9-volt backup battery is switched in by diodes D5 and D8 during power line failures to keep the clock running. In order to conserve battery power, the display is switched off during these periods and the alarm is inoperative.

Dual primary windings on the power transformer permit wiring for either 120 VAC or 240 VAC power line operation.

Transistors Q4 and Q5 and their associated components operate a dimming circuit by changing the -4.9 volt supply to the display LED, in response to ambient light conditions. When the room lighting is bright, the resistance of the LDR is low. This increases the base voltage of Q4 which, in turn, lowers the base voltage of Q5 and raises its collector voltage. This provides a higher voltage potential to the display and increases its brightness. The opposite happens when the room lighting gets dimmer.

Transistors Q1, Q2, and Q3 comprise the alarm circuit. Transistors Q1 and Q2 form an emitter-coupled oscillator, which produces a continuous tone of approximately 300 Hz. Transistor Q2 also serves as a power amplifier to drive the speaker. Switch SW6 selects a hi or lo volume. Transistor Q3 is switch-triggered at a 1000 Hz rate by IC1 and switches the oscillator on and off to provide a beeping sound in the 12-hour mode. Pin 26 of IC1 provides the alarm on-off signal.

A green color, four-digit, seven-segment LED display is used in the clock. Each light segment of the display is illuminated by a voltage signal from IC1.

A block diagram of the clock IC appears on Page 18 of the Illustration Booklet.

SEMICONDUCTOR IDENTIFICATION

COMPONENT NUMBER	HEATH PART NUMBER	MAY BE REPLACED WITH	KEY NUMBER
---------------------	-------------------------	----------------------------	---------------

DIODES

D1	56-28	1N4148	A1
D3	56-28	1N4148	A1
D2 - D5	57-65	1N4001	A1
D8	230-5860	LTL-3211A	A2
D9	230-5862	LTL-3231A	A2

TRANSISTORS

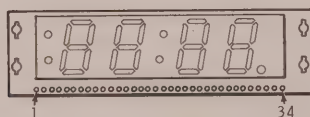
Q1 - Q3	230-5865	2SC536 or 2SC1815	A3
Q4	230-5864	2SA1246 or 2SA1318	A3
Q5	230-5866	2SD400	A4

INTEGRATED CIRCUIT

IC1	230-5863	LM8363	A5
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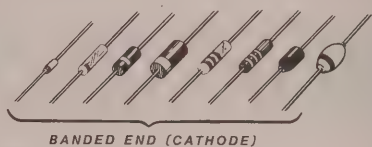
LED DISPLAY

230-5861	LTC-755A1G-24
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A1

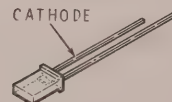
IMPORTANT: THE BANDED END OF DIODES
CAN BE MARKED IN A NUMBER OF WAYS.



BANDED END (CATHODE)

A2

CATHODE



A3

EMITTER (E)
BASE (B)
COLLECTOR (C)



A4

EMITTER (E)
BASE (B)
COLLECTOR (C)



A5

BLANKING INPUT	1	42	CR INPUT
AM OUTPUT	2	41	PM OUTPUT
10HRS-b&c	3	40	1Hz OUTPUT
HRS-f	4	39	24/12HR SELECT
HRS-g	5	38	ALARM 2 DISPLAY INPUT
HRS-a	6	37	50/60 Hz SELECT
HRS-b	7	36	50/60 Hz INPUT
HRS-c	8	35	UPPER SET INPUT
HRS-d	9	34	LOWER SET INPUT
HRS-e	10	33	SECONDS DISPLAY INPUT
10 MINS-f	11	32	ALARM 1 DISPLAY INPUT
10 MINS-g	12	31	SLEEP DISPLAY INPUT
10 MINS-d&d	13	30	V _{DD}
10 MINS-b	14	29	ALARM 2 OFF INPUT
10 MINS-e	15	28	SLEEP OUTPUT
10 MINS-c	16	27	ALARM 1 OFF INPUT
MINS-f	17	26	ALARM OUTPUT
MINS-g	18	25	SNOOZE INPUT
MINS-a	19	24	V _{SS}
MINS-b	20	23	MINS-c
MINS-e	21	22	MINS-d

PIN CONNECTION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
-COM	+PM	+AM	+1A	+1F	+1G	+1E	+1D	+1C	+1B	+2F	+2G	+2A	+2B	+2D	+2C	+2E
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
+UC	+LC	+3F	+3G	+3A +3D	+3B	+3E	+3C	+4F	+4G	+4A	+4B	+4E	+4D	+4C	+4L	-COM

CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath/Zenith Computers and Electronics centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH/ZENITH COMPUTER AND ELECTRONICS CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath/Zenith Computer and Electronics centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath/Zenith Computer and Electronics center.

TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. You'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

Please do not send parts for testing, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heath/Zenith Computer and Electronics center facilities are also available for telephone or "walk-in" personal assistance.

REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

If it is convenient, personally deliver your kit to a Heath/Zenith Computers and Electronics center. For warranty parts replacement, supply a copy of the invoice or sales slip.

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:


- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least **THREE INCHES** of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022

Heath Company
Benton Harbor, Michigan

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SELL
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\$17



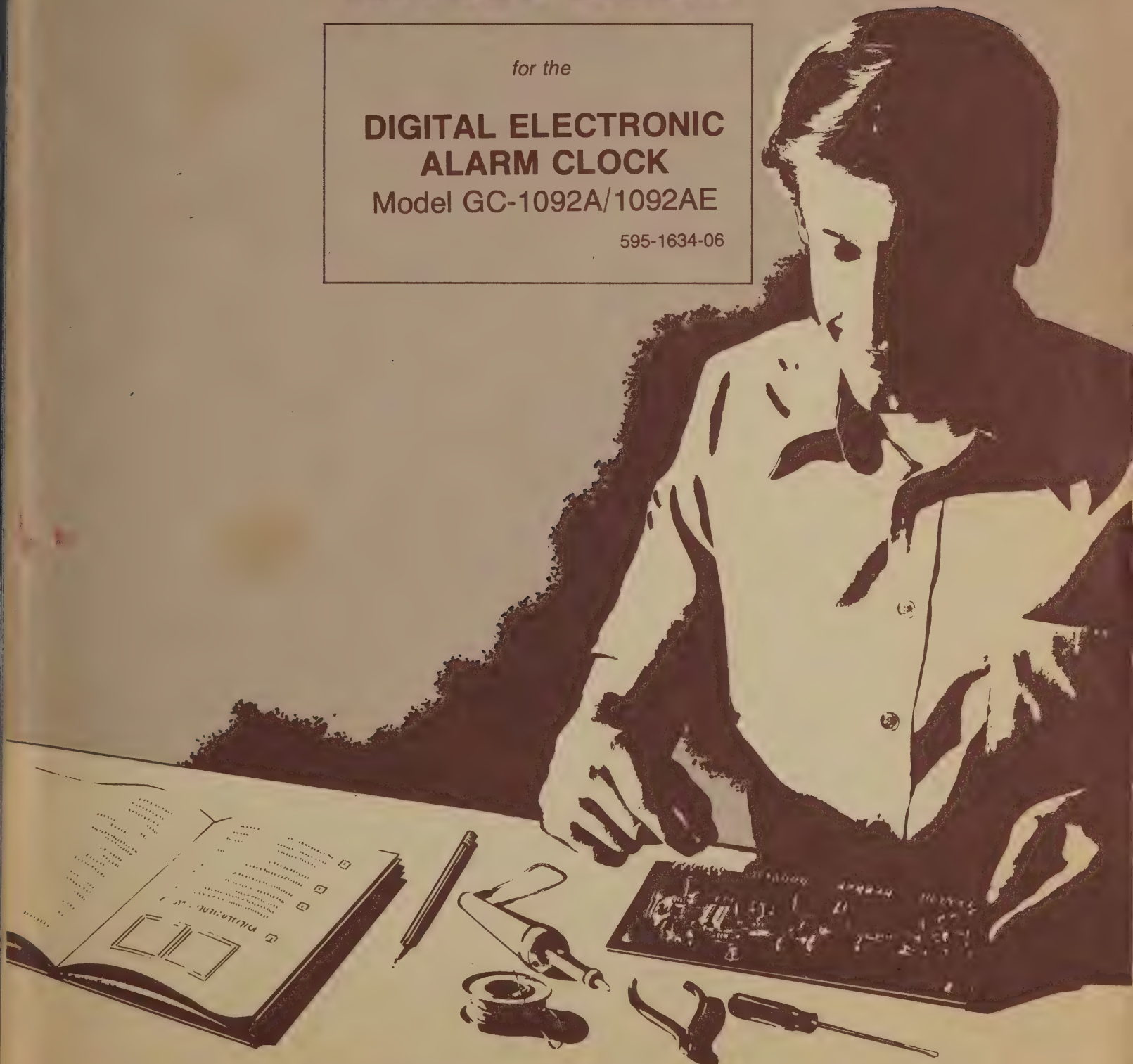
HEATHKIT[®] MANUAL

for the

DIGITAL ELECTRONIC ALARM CLOCK

Model GC-1092A/1092AE

595-1634-06



HEATH COMPANY • BENTON HARBOR, MICHIGAN

HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

Kit orders and delivery information (616) 982-3411
Credit (616) 982-3561
Replacement Parts (616) 982-3571
Technical Assistance:
R/C, Audio, and Electronic Organs (616) 982-3310
Amateur Radio (616) 982-3296
Test Equipment, Strobe Lights, Calculators,
Clocks, Weather Instruments (616) 982-3315
Television (616) 982-3307
Automotive, Marine, Appliances,
Security, General Products (616) 982-3496

YOUR HEATHKIT 90-DAY FULL WARRANTY

If you are not satisfied with our service - warranty or otherwise - or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

Our attorney, who happens to be quite a kitbuilder himself, insists that we describe our warranty using all the necessary legal phrases in order to comply with the new warranty regulations. Fine. Here they are:

For a period of ninety (90) days after purchase, Heath Company will replace or repair free of charge any parts that are defective either in materials or workmanship. You can obtain parts directly from Heath Company by writing us at the address below or by telephoning us at (616) 982-3571. And we'll pay shipping charges to get those parts to you — anywhere in the world.

We warrant that during the first ninety (90) days after purchase, our products, when correctly assembled, calibrated, adjusted and used in accordance with our printed instructions, will meet published specifications.

If a defective part or error in design has caused your Heathkit product to malfunction during the warranty period through no fault of yours, we will service it free upon proof of purchase and delivery at your expense to the Heath factory, any Heathkit Electronic Center (units of Schlumberger Products Corporation), or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by the use of corrosive solder, defective tools, incorrect assembly, misuse, fire, or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for customer assembly or set-up time.

This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. **We are not responsible for incidental or consequential damages.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH COMPANY
BENTON HARBOR, MI. 49022

Assembly
and
Operation
of the



DIGITAL ELECTRONIC
ALARM CLOCK

MODEL GC-1092A
OR
MODEL GC-1092AE

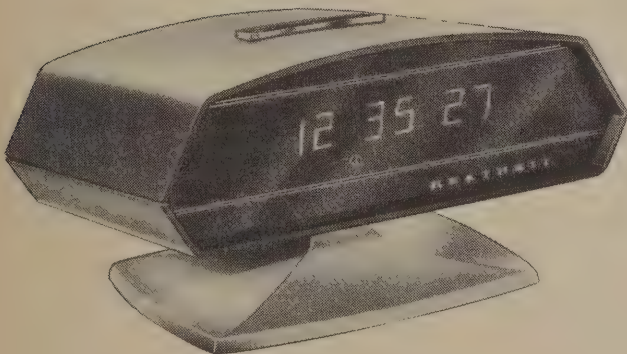
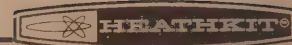


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HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022



INTRODUCTION

The Heathkit Model GC-1092A and Model GC-1092AE Clocks use an MOS/LSI* integrated circuit that performs all of the logic functions necessary for accurate time keeping. Following are some of the unusual features of both clock models:

- A 6-digit, easy-to-read display that automatically dims to adjust to room brightness. This dimming feature can be defeated if the Clock is to be used as a night light.
- Automatic battery operation in case of a power failure. The clock will continue to keep time for over six hours if nickel-cadmium batteries are used. (Time is not displayed during battery operation, however the alarm will work.)
- AM or PM alarm with a "snooze alarm" that waits for approximately seven minutes each time it is reset before the alarm sounds again.
- Switch-selectable 12-hour or 24-hour time display.

- Touch-bar on top of the case that turns the alarm off or starts the snooze alarm.

The time is indicated by six 7-segment display digits mounted behind an attractive translucent window. The Clock is mounted on an adjustable pedestal base which allows the clock face to be tilted up or down for best viewing, or you may remove the pedestal base if desired.

The Model GC-1092A Clock will only operate from a 120 volt, 60 Hz power source, while the Model GC-1092AE Clock can be wired to operate from a 120-240 volt, 50/60 Hz power source.

Modern styling, small size, and solid-state dependability, make these Clocks ideally suited for use almost anywhere.

Refer to the "Kit Builders Guide" for complete information on unpacking, parts identification, tools, wiring, soldering, and step-by-step assembly procedures.

*MOS/LSI (Metal Oxide Semiconductor/Large Scale Integration).

PARTS LIST

Check each part against the following list. Make a (✓) in the space provided as each part is identified. Any part that is packaged in an individual envelope with a part number on it should be placed back in the envelope after you identify it until it is called for in a step. Do not throw away any packing material until all parts are accounted for.

To order a replacement part, use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of the Manual. For pricing information, refer to the separate "Heath Parts Price List."

CAUTION: Integrated circuit #443-687 can be damaged by static voltage. Do not handle it until you are directed to do so in a step.

Each circuit part in this kit has its own component number (R2, C4, etc.). Use these numbers when you want to

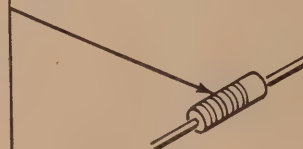
positively identify the same part in the various sections of the Manual. These numbers, which are especially useful if a part has to be replaced, appear:

- In the Parts List,
- At the beginning of each step where a component is installed,
- In some illustrations,
- In the Schematic,
- In the sections at the rear of the Manual.

If you intend to use the automatic battery operation function of your clock, purchase three AA penlight batteries at this time for use in the completed kit. Representative manufacturers, their battery type numbers, and other pertinent information follows. **NOTE:** The clock will operate without batteries. However, if you use it this way, it will have to be reset each time it is moved and whenever a power failure occurs.

BATTERY	TYPE	VOLTAGE	EXPECTED LIFE IN CLOCK	APPROXIMATE DISCHARGE TIME	APPROXIMATE CHARGING TIME
Eveready #CH500	Nickel-cadmium	1.2	Several years	6 hours	28 hours
NEDA 15M	Mercuric-dioxide	1.4	Over 12 months	18 hours	nonrechargeable
NEDA 15A	Alkaline-	1.5	12 months	10 hours	nonrechargeable
	manganese-dioxide				
NEDA 15	Zinc-carbon	1.5	6 months	3.5 hours	nonrechargeable

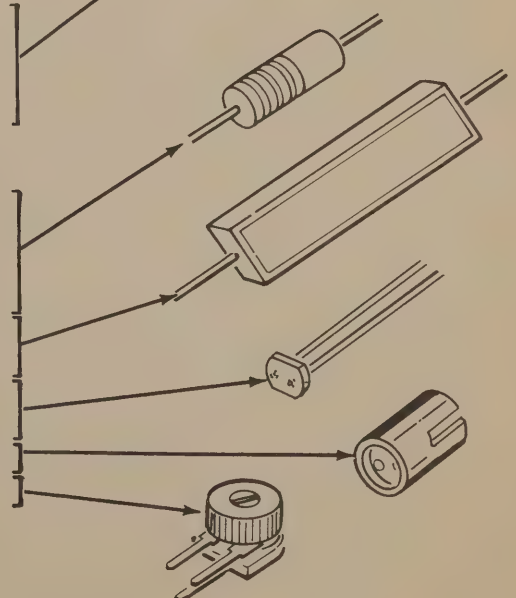
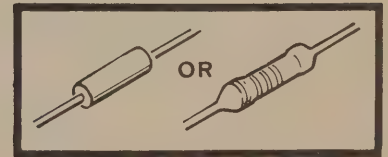
QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
RESISTORS, 1/2-Watt			
NOTE: The following resistors have a 10% tolerance (silver fourth band) unless otherwise noted. Resistors with a gold fourth band have a 5% tolerance.			
() 1	560 Ω (green-blue-brown)	1-119	R207
() 2	1000 Ω (brown-black-red)	1-9	R113, R204
() 1	1200 Ω (brown-red-red)	1-10	R258
() 1	1500 Ω (brown-green-red)	1-11	R101
() 1	2200 Ω (red-red-red)	1-44	R212
() 1	3300 Ω (orange-orange-red)	1-14	R256
() 1	3900 Ω (orange-white-red)	1-46	R218
() 1	8200 Ω (gray-red-red)	1-73	R252
() 1	10 k Ω (brown-black-orange)	1-20	R211
() 2	12 k Ω , 5% (brown-red-orange-gold)	1-109	R126, R219
() 6	15 k Ω , 5% (brown-green-orange-gold)	1-133	R117, R119, R122, R124, R128, R131
() 5	18 k Ω (brown-gray-orange)	1-69	R107, R112, R115, R215, R217
() 6	22 k Ω (red-red-orange)	1-22	R224, R228, R233, R237, R242, R246
() 1	27 k Ω (red-violet-orange)	1-23	R205
() 9	33 k Ω (orange-orange-orange)	1-24	R105, R106, R116, R118, R121, R123, R125, R127, R129
() 2	39 k Ω (orange-white-orange)	1-67	R146, R213
() 2	47 k Ω (yellow-violet-orange)	1-25	R114, R216
() 1	56 k Ω (green-blue-orange)	1-47	R206
() 1	82 k Ω (gray-red-orange)	1-102	R222



QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
Resistors (cont'd.)			
(✓) 23	100 k Ω (brown-black-yellow)	1-26	R109, R132, R133, R134, R135, R136, R137, R214, R223, R225, R227, R229, R232, R234, R236, R238, R241, R243, R245, R247, R254, R255, R259
() 1	120 k Ω (brown-red-yellow)	1-121	R221
() 2	180 k Ω (brown-gray-yellow)	1-126	R253, R257
() 6	220 k Ω (red-red-yellow)	1-29	R226, R231, R235, R239, R244, R248
() 2	270 k Ω (red-violet-yellow)	1-30	R249, R251
() 2	470 k Ω (yellow-violet-yellow)	1-33	R108, R145
() 2	1 M Ω (brown-black-green)	1-35	R111, R240
() 6	100 M Ω (brown-black-violet)	1-139	R138, R139, R141, R142, R143, R144

Other Resistors

(✓) 1	1130 Ω (1.13 k) precision	2-57-12	R209
() 1	24 k Ω precision	2-268	R208
(✓) 1	180 k Ω precision	2-8-11	R102
(✓) 1	1 M Ω precision	2-96-12	R104
() 1	10 M Ω , 1/4-watt (brown-black-blue)	1-88-12	<u>Used as tool</u>
() 1	150 Ω , 1-watt (brown-green-brown)	1-18-1	R202
() 1	680 Ω , 1-watt (blue-gray-brown)	1-21-1	R203
(✓) 1	4700 Ω (4.7 k), 7-watt, wire-wound	3-21-7	R201
(✓) 1	Light dependent resistor (LDR)	9-67	LDR101
(✓) 1	LDR shield	266-8 7	
(✓) 1	470 k Ω control	10-985	R103



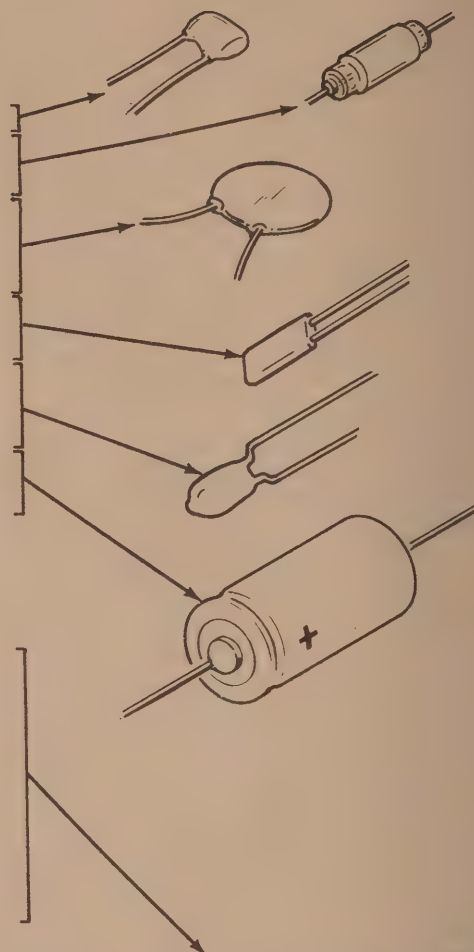
QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
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CAPACITORS

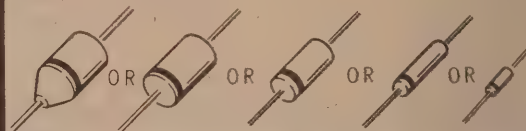
(✓)	1	50 pF mica	20-97	C208
(✓)	1	.01 μ F (10,000 pF) polystyrene	29-2	C101
(✓)	1	.001 μ F disc	21-140	C204
(✓)	1	.005 μ F disc	21-27	C102
(✓)	1	.02 μ F disc	21-31	C202
(✓)	2	.01 μ F Mylar *	27-74	C205, C209
(✓)	1	.047 μ F Mylar	27-73	C210
(✓)	5	10 μ F tantalum	25-220	C103, C104, C105, C206, C207
(✓)	1	20 μ F electrolytic	25-16	C201
(✓)	1	1200 μ F electrolytic	25-241	C203

DIODES

()	3	1N2071	57-27	D201, D202, D203
()	4	1N4002	57-65	D207, D208, D211, D212
()	1	VR-16.1G zener	56-36	D209
()	1	1N716A zener (violet-brown-blue)	56-57	D213
()	3	ZVR-68 zener	56-68	D204, D205, D206



NOTE: HEATH PART NUMBERS ARE STAMPED ON MOST DIODES.



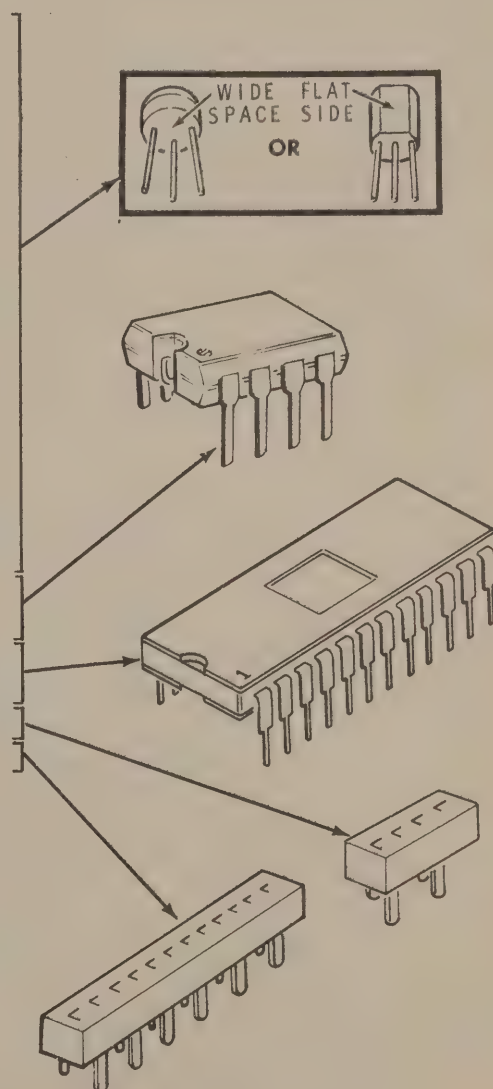
QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
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TRANSISTORS-INTEGRATED CIRCUITS-SOCKET STRIPS

NOTE: Transistors and integrated circuits are marked in one of the following four ways:

1. Part number.
2. Transistor or integrated circuit type number. (For integrated circuits, this refers only to the numbers; the letters may be different.)
3. Part number and type number.
4. Part number with a type number other than the one listed.

(✓)	1	2N3643 transistor	417-233	Q203
()	2	2N4121 transistor	417-235	Q205, Q223
(✓)	14	MPS-A42 transistor	417-294	Q105, Q106, Q107, Q108, Q109, Q111, Q112, Q113, Q208, Q211, Q213, Q215, Q217, Q219
()	6	MPS-L51 transistor	417-295	Q209, Q212, Q214, Q216, Q218, Q221
(✓)	11	MPS-A20 transistor	417-801	Q101, Q102, Q103, Q104, Q201, Q202, Q204, Q206, Q207, Q222, Q224
(✓)	2	NE555V integrated circuit	442-53	IC101, IC102
(✓)	1	MK5017AA integrated circuit	443-687*	IC201
(✓)	4	4-pin socket strip	434-264	
(✓)	2	12-pin socket strip	434-263	

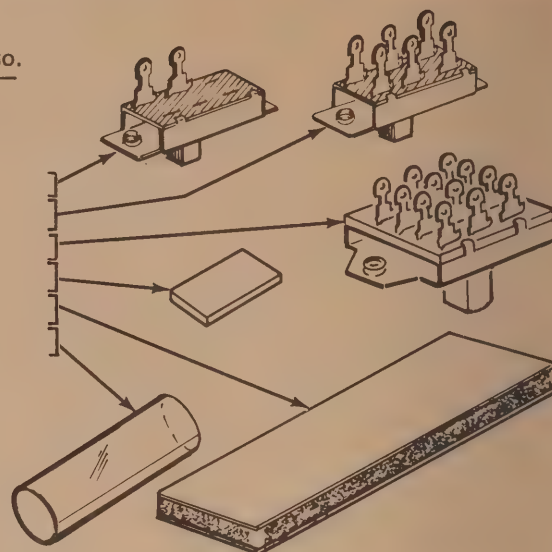


* CAUTION: Integrated circuit #443-687 can be damaged by static voltage. Do not remove it from its container until you are directed to do so in a step.

QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
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SWITCHES-INSULATORS-SLEEVING-WIRE

(/)	2	2-lug switch (SPST)	60-6
(✓)	5	6-lug switch (DPDT)	60-2
(/)	1	12-lug switch (4PDT)	60-29
(✓)	8	Plastic foot	75-138
(/)	1	Foam tape	73-92
(/)	1	Large clear sleeve	346-60
()	1	Small sleeving	346-1
()	1	Heat-shrinkable sleeving	346-20
()	1	Small bare wire	340-8
()	1	Large bare wire	340-11
()	1	Flat 8-wire cable	347-55
()	1	Fish paper	75-108

**HARDWARE****#4 Hardware**

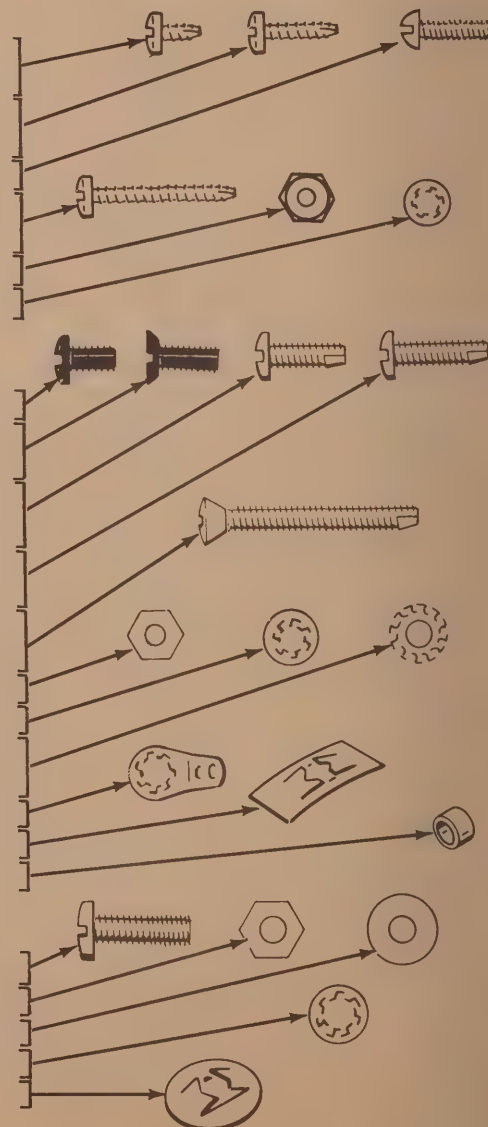
()	2	#4 x 3/16" self-tapping screw	250-489
()	4	#4 x 3/8" self-tapping screw	250-186
()	2	4-40 x 3/8" screw	250-4
()	2	#4 x 3/4" self-tapping screw	250-477
()	2	4-40 nut	252-2
()	2	#4 lockwasher	254-9

#6 Hardware

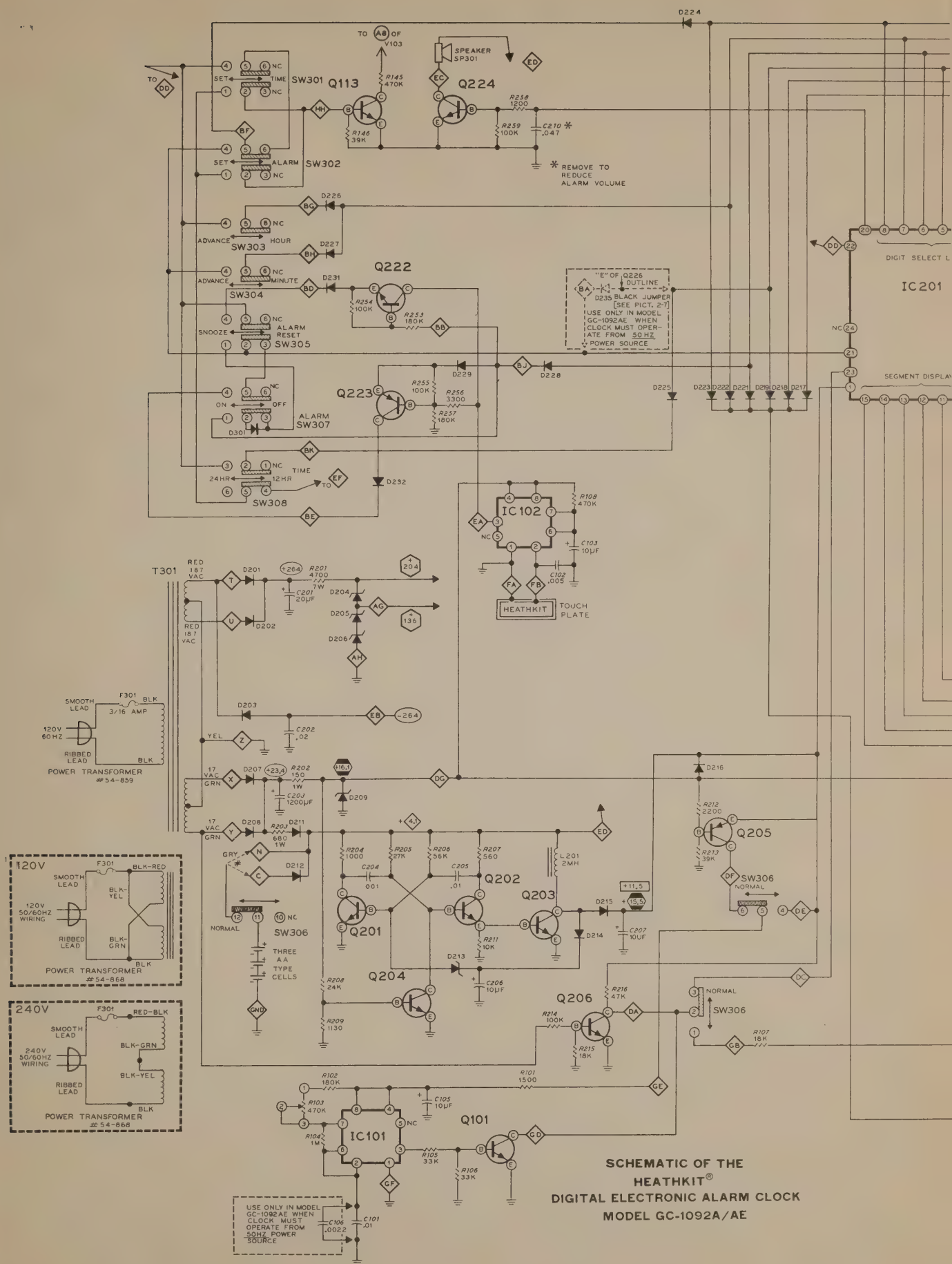
()	4	6-32 x 1/4" screw	250-452
()	15	6-32 x 3/8" flat head screw	250-276
()	2	#6 x 3/8" self-tapping screw	250-592
()	1	#6 x 1/2" self-tapping screw	250-591
()	4	#6 x 1-1/8" self-tapping screw	250-1137
()	3	6-32 nut	252-3
()	2	#6 lockwasher	254-1
()	1	#6 external tooth lockwasher	254-6
()	10	#6 solder lug	259-1
()	4	#6 Speed Nut*	252-10
()	2	#6 x 5/32" spacer	255-73

#8 Hardware

()	2	8-32 x 1/2" screw	250-585
()	2	8-32 nut	252-4
()	1	#8 flat washer	253-9
()	2	#8 lockwasher	254-2
()	2	Push-on nut	252-116



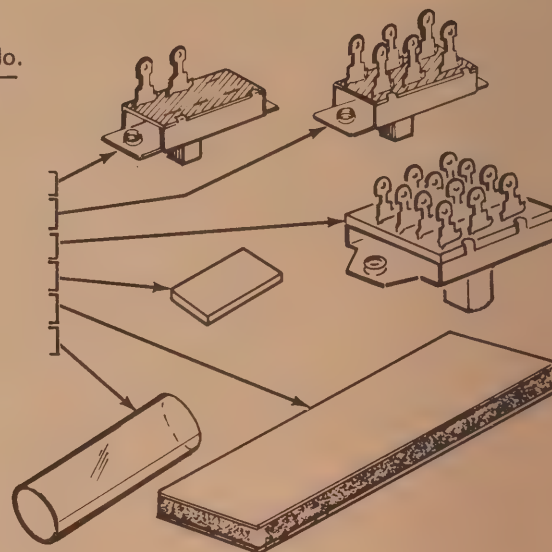
*Registered Trademark, Tinnerman Co.



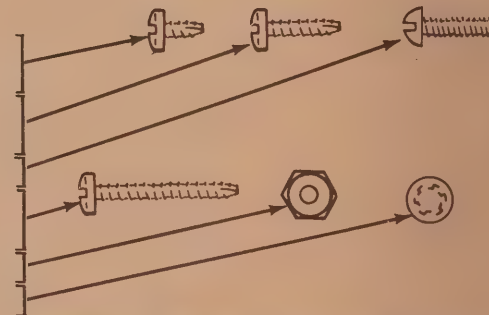
QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
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SWITCHES-INSULATORS-SLEEVING-WIRE

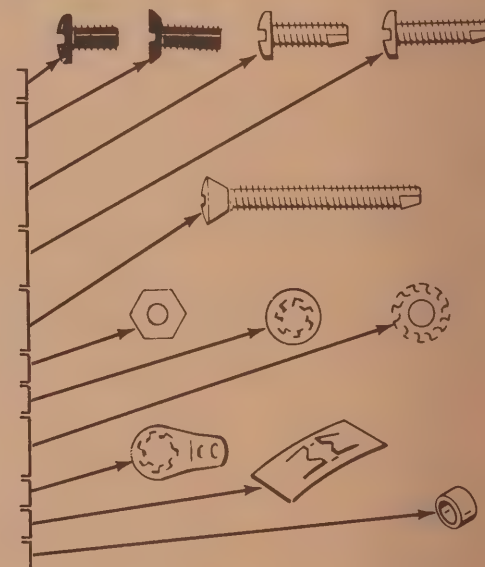
()	2	2-lug switch (SPST)	60-6
()	5	6-lug switch (DPDT)	60-2
()	1	12-lug switch (4PDT)	60-29
()	8	Plastic foot	75-138
()	1	Foam tape	73-92
()	1	Large clear sleeve	346-60
()	1	Small sleeving	346-1
()	1	Heat-shrinkable sleeving	346-20
()	1	Small bare wire	340-8
()	1	Large bare wire	340-11
()	1	Flat 8-wire cable	347-55
()	1	Fish paper	75-108

**HARDWARE****#4 Hardware**

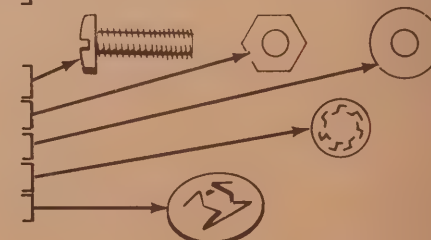
()	2	#4 x 3/16" self-tapping screw	250-489
()	4	#4 x 3/8" self-tapping screw	250-186
()	2	4-40 x 3/8" screw	250-4
()	2	#4 x 3/4" self-tapping screw	250-477
()	2	4-40 nut	252-2
()	2	#4 lockwasher	254-9

**#6 Hardware**

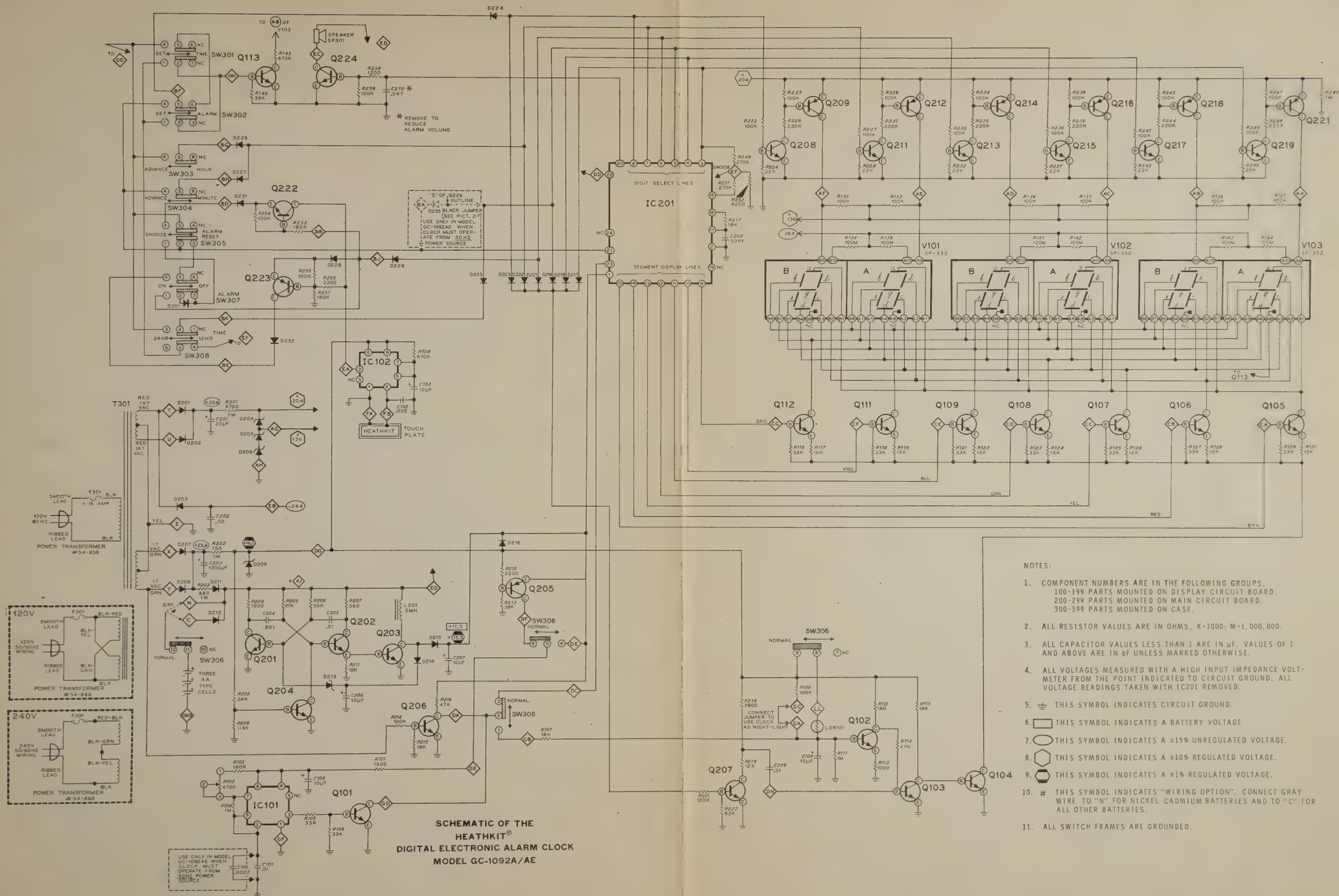
()	4	6-32 x 1/4" screw	250-452
()	15	6-32 x 3/8" flat head screw	250-276
()	2	#6 x 3/8" self-tapping screw	250-592
()	1	#6 x 1/2" self-tapping screw	250-591
()	4	#6 x 1-1/8" self-tapping screw	250-1137
()	3	6-32 nut	252-3
()	2	#6 lockwasher	254-1
()	1	#6 external tooth lockwasher	254-6
()	10	#6 solder lug	259-1
()	4	#6 Speed Nut*	252-10
()	2	#6 x 5/32" spacer	255-73

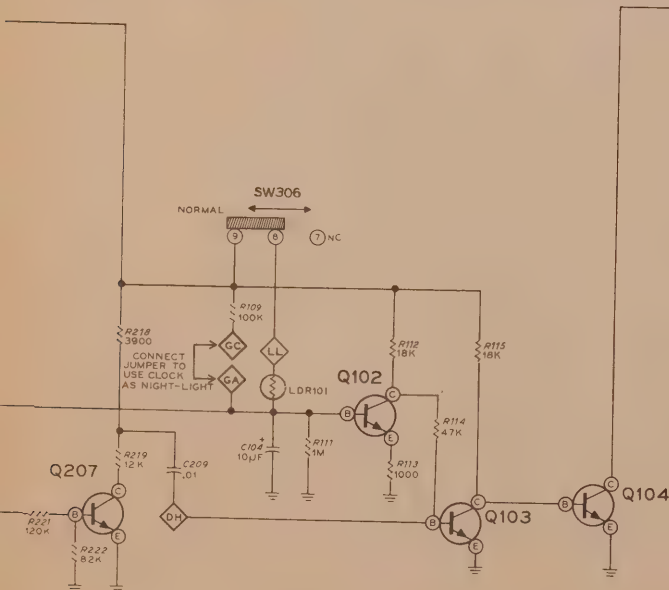
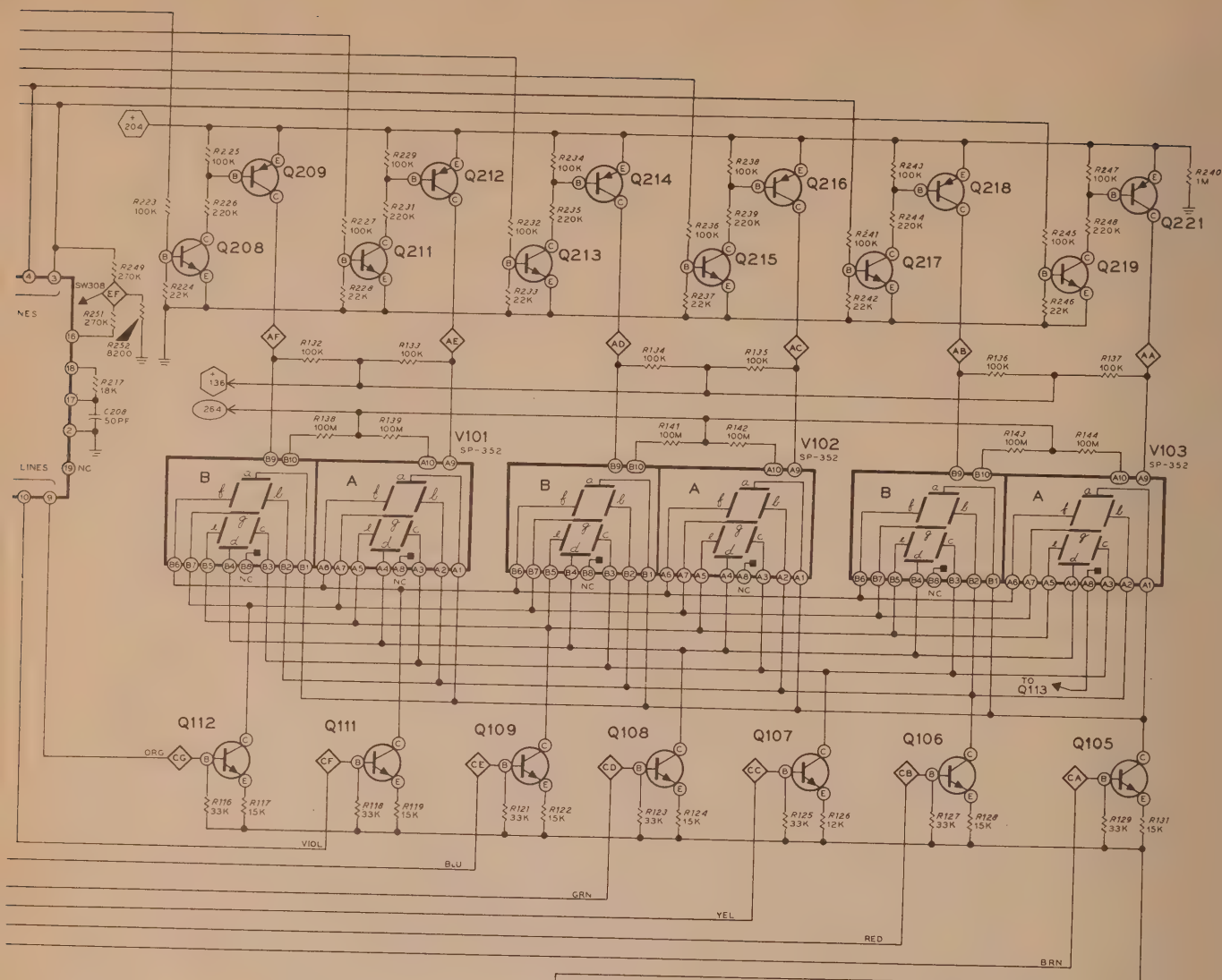
**#8 Hardware**

()	2	8-32 x 1/2" screw	250-585
()	2	8-32 nut	252-4
()	1	#8 flat washer	253-9
()	2	#8 lockwasher	254-2
()	2	Push-on nut	252-116



*Registered Trademark, Tinnerman Co.





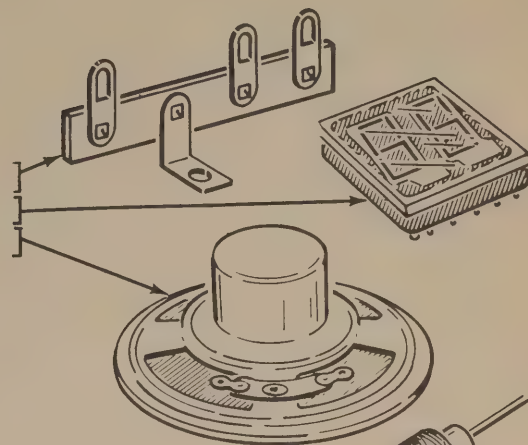
NOTES:

1. COMPONENT NUMBERS ARE IN THE FOLLOWING GROUPS:
100-199 PARTS MOUNTED ON DISPLAY CIRCUIT BOARD.
200-299 PARTS MOUNTED ON MAIN CIRCUIT BOARD.
300-399 PARTS MOUNTED ON CASE.
2. ALL RESISTOR VALUES ARE IN OHMS, K=1,000; M=1,000,000.
3. ALL CAPACITOR VALUES LESS THAN 1 ARE IN μ F. VALUES OF 1 AND ABOVE ARE IN pF UNLESS MARKED OTHERWISE.
4. ALL VOLTAGES MEASURED WITH A HIGH INPUT IMPEDANCE VOLT-METER FROM THE POINT INDICATED TO CIRCUIT GROUND. ALL VOLTAGE READINGS TAKEN WITH IC201 REMOVED.
5. \equiv THIS SYMBOL INDICATES CIRCUIT GROUND.
6. \square THIS SYMBOL INDICATES A BATTERY VOLTAGE.
7. \circ THIS SYMBOL INDICATES A $\pm 15\%$ UNREGULATED VOLTAGE.
8. \hexagon THIS SYMBOL INDICATES A $\pm 10\%$ REGULATED VOLTAGE.
9. $\text{hexagon with cross}$ THIS SYMBOL INDICATES A $\pm 1\%$ REGULATED VOLTAGE.
10. # THIS SYMBOL INDICATES "WIRING OPTION". CONNECT GRAY WIRE TO "N" FOR NICKEL CADMIUM BATTERIES AND TO "C" FOR ALL OTHER BATTERIES.
11. ALL SWITCH FRAMES ARE GROUNDING.

QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
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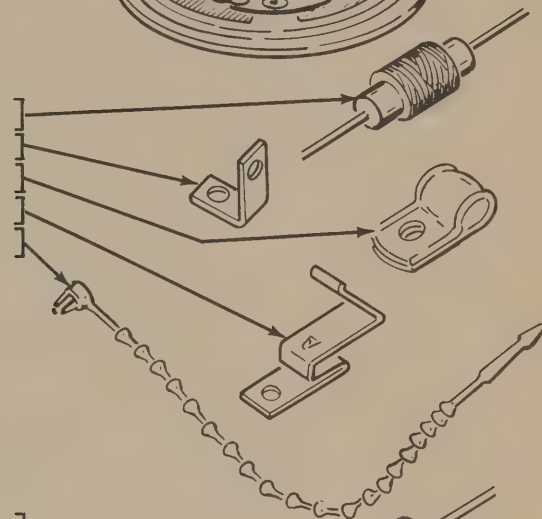
TERMINAL STRIP-DISPLAY TUBES-SPEAKER

(✓)	1	Terminal strip	431-96	SP-301
(✓)	3	SP-352 display tube	411-295	
(✓)	1	Speaker	401-163	

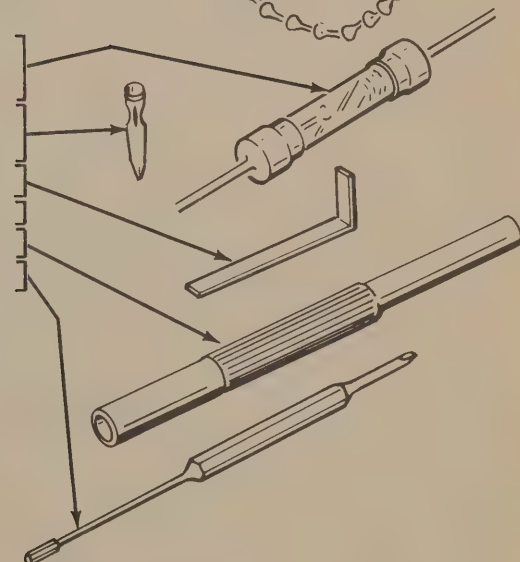


MISCELLANEOUS

(✓)	1	2 mH choke	45-84	L201
(✓)	2	Bracket	204-102	
(✓)	1	Clamp	207-5	
(✓)	6	Battery contact	260-83	
(✓)	2	Cable tie	354-6	



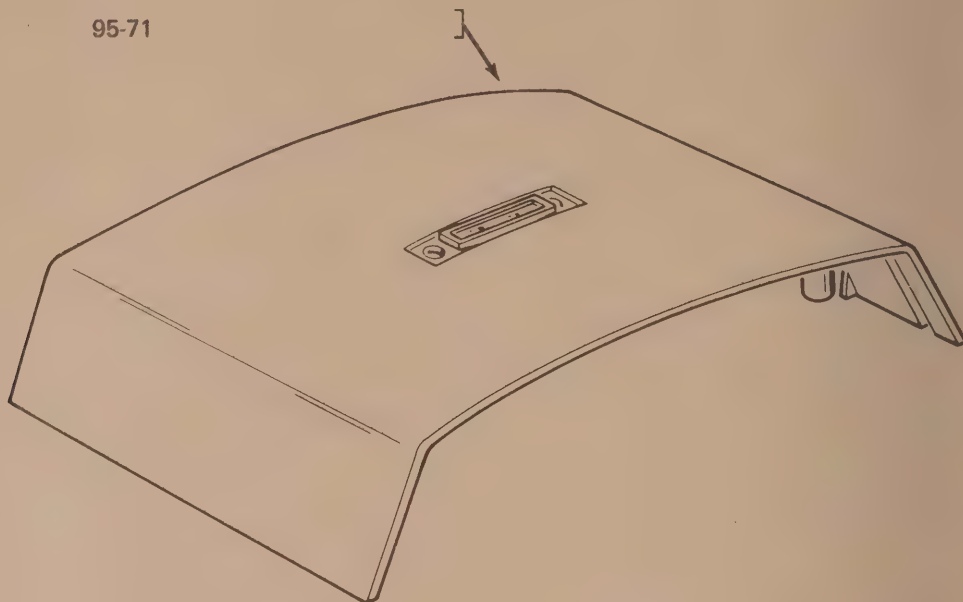
(✓)	1	3/16-ampere slow-blow fuse	421-40	F301
(✓)	65	Connector pin (2 extra)	432-134	
()	1	IC puller	490-111	
(✓)	1	Nut starter	490-5	
(✓)	1	Alignment tool	490-109	
(✓)	1	Line cord	89-44	



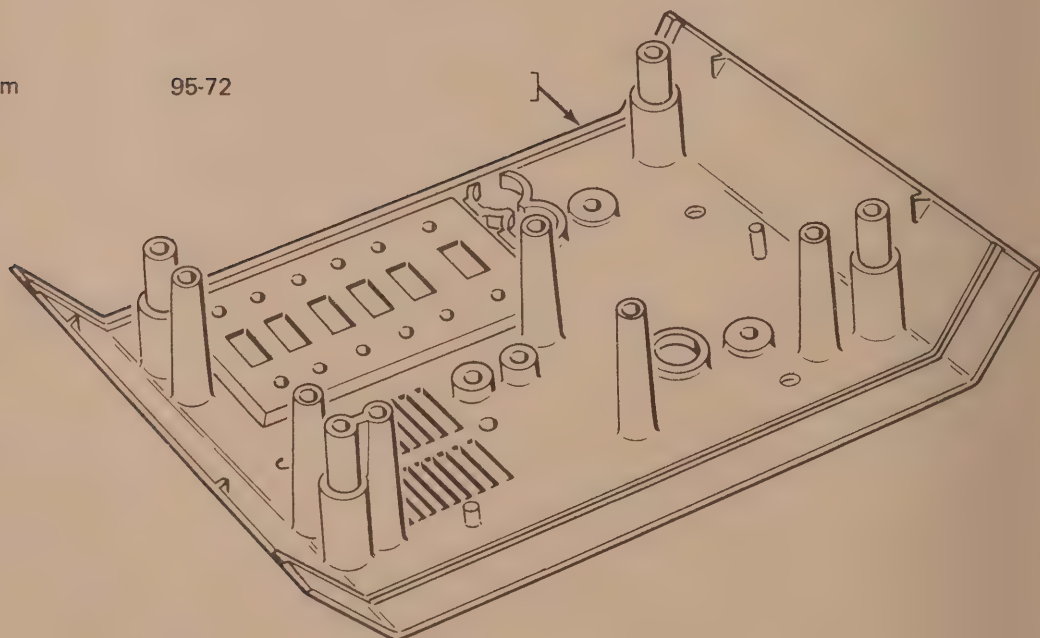
QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
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Miscellaneous (cont'd.)

() 1 Case top 95-71



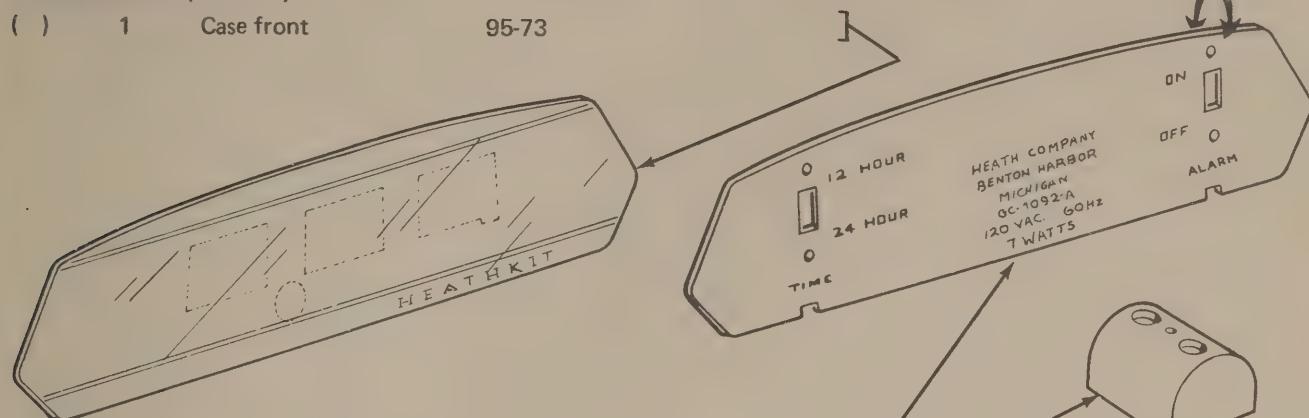
() 1 Case bottom 95-72



QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
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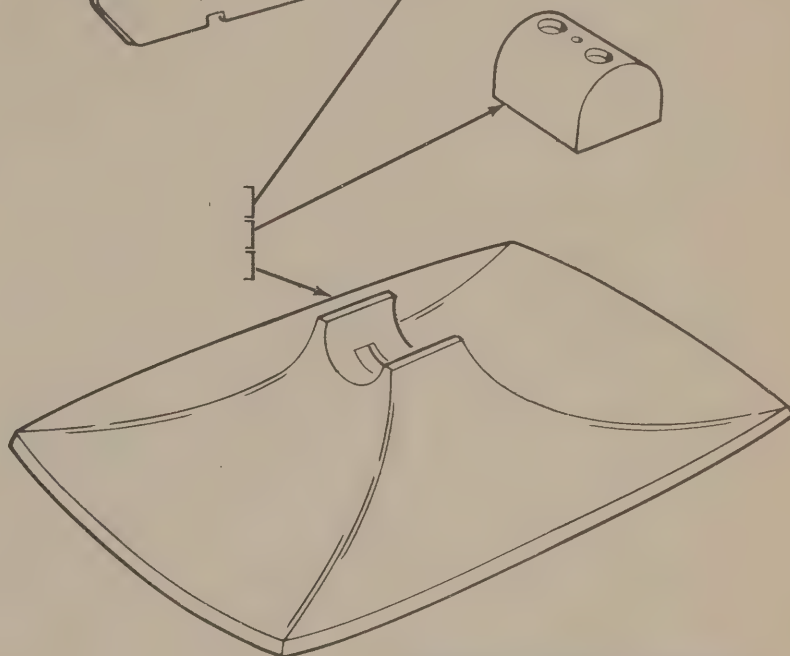
Miscellaneous (cont'd.)

() 1 Case front 95-73



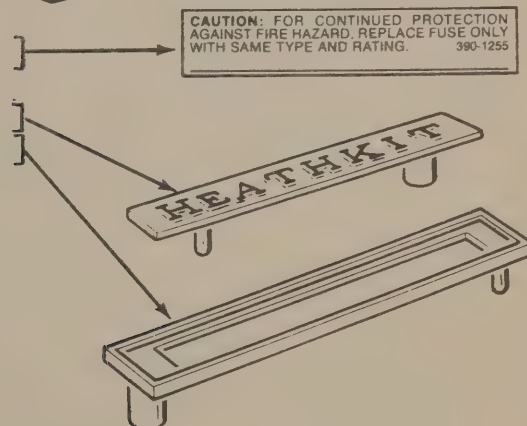
LETTERING
ON BOTH SIDES

() 1 Case back 95-75
 (✓) 1 Pedestal pivot 95-74
 () 1 Pedestal base 95-76



() 1 Fuse label 390-1255
 () 1 Switch label 390-1062
 (✓) 1 Nameplate 391-90
 (✓) 1 Nameplate frame 391-89
 () 1 Blue and white identification label 391-34
 () 1 Main circuit board 85-1429-3
 () 1 Display circuit board 85-1430-2
 () 2 Strip of numbers 390-949
 () 1 Parts Order Form 597-260
 () 1 Kit Builders Guide 597-308
 () Solder
 () Manual (See Page 1 for part number.)

CAUTION: FOR CONTINUED PROTECTION
 AGAINST FIRE HAZARD, REPLACE FUSE ONLY
 WITH SAME TYPE AND RATING. 390-1255



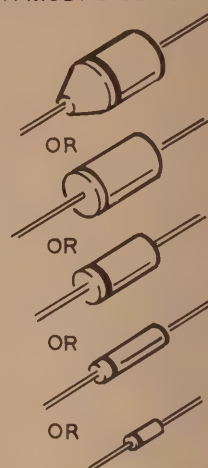
QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
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Miscellaneous (cont'd.)

NOTE: The following parts will be used only in the Model GC-1092A.

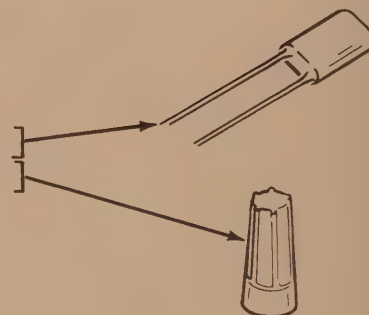
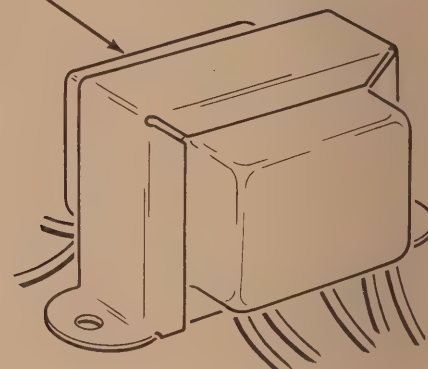
()	18	1N4149 diode	56-56	D214, D215, D216, D217, D218, D219, D221, D222, D223, D224, D225, D226, D227, D228, D229, D231, D232, D301
()	1	Power transformer	54-859	T301

NOTE: HEATH PART
NUMBERS ARE STAMPED
ON MOST DIODES.



NOTE: The following parts will be used only in the Model GC-1092AE.

()	19	1N4149 diode	56-56	D214, D215, D216, D217, D218, D219, D221, D222, D223, D224, D225, D226, D227, D228, D229, D231, D232, D235, D301
()	1	Power transformer	54-868	T301
()	1	.0022 μ F Mylar capacitor	27-70	C106
()	1	Wire nut	432-199	
()	1	Black wire	344-90	
()	1	Power label	390-1078	



ASSEMBLY NOTES

1. This Manual can be used to assemble either the Model GC-1092A (which operates only from a 120-volt, 60 Hz power source) or the Model GC-1092AE (export version, which may be wired to operate from a 120-volt or 240-volt, 50 or 60 Hz power source). Pictorials and steps are provided in various parts of the Manual that are only applicable for one Clock or the other. Perform only those steps that pertain to your Clock.
2. Before you start to assemble this kit, read the "Kit Builders Guide" for complete information on wiring, soldering, and step-by-step assembly procedures.
3. Resistors will be identified by the resistance value, in ohms (Ω , $k\Omega$, or $M\Omega$), and color code.
4. Capacitors will be identified by the capacitance value (in pF or μF) and type (disc, mica, electrolytic, etc.).
5. The circuit boards supplied in this clock kit were also designed for use in another clock model. Therefore, some of the component locations on the circuit boards are marked with an R or C number instead of the resistance or capacitance value. The value will depend on the clock model being assembled. Also, there will be some locations on the circuit boards where, in this kit, no component will be installed.

Due to the small foil area around the circuit board holes and the small areas between foils, it will be necessary to use the utmost care to prevent solder bridges between adjacent foil areas. Use only a minimum amount of solder and use no larger than a 25-watt soldering iron with a small tip. Allow it to reach operating temperature, and then apply it long enough to make a good solder connection.

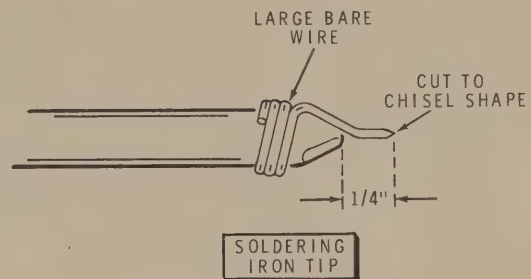


Figure 1

If a small wattage, small-tip soldering iron is not available, proceed as follows: Be sure your soldering iron is cool. Wrap the supplied large bare wire tightly around the soldering iron tip as shown in Figure 1. Allow approximately 1/4" of wire to extend beyond the end of the soldering iron. Cut the wire end to a chisel shape as shown. Occasionally apply solder to the turns of large bare wire to achieve a good heat transfer.

SAFETY WARNING: Avoid eye injury when you clip off excess lead lengths. We suggest you wear glasses, or at least clip the leads so the ends will not fly toward your eyes.

STEP-BY-STEP ASSEMBLY

FOR GOOD SOLDER CONNECTIONS, YOU MUST
KEEP THE SOLDERING
IRON TIP CLEAN.
WIPE IT OFTEN
WITH A DAMP
SPONGE OR CLOTH.



START



Position the display circuit board as shown. Then complete each step in the order listed.

(✓) R108: 470 k Ω (yellow-violet-yellow).

(✓) R124: 15 k Ω (brown-green-orange).

(✓) R132: 100 k Ω (brown-black-yellow).

(✓) R111: 1 M Ω (brown-black-green).

(✓) R133: 100 k Ω (brown-black-yellow).

(✓) R109: 100 k Ω (brown-black-yellow).

(✓) R107: 18 k Ω (brown-gray-orange).

() Solder the leads to the foil and cut off the excess lead lengths.

(✓) R136: 100 k Ω (brown-black-yellow).

(✓) R106: 33 k Ω (orange-orange-orange).

(✓) R137: 100 k Ω (brown-black-yellow).

(✓) R105: 33 k Ω (orange-orange-orange).

(✓) R101: 1500 Ω (brown-green-red).

(✓) R104: 1 M Ω precision.

(✓) R102: 180 k Ω precision.

() Solder the leads to the foil and cut off the excess lead lengths.

CONTINUE



(✓) R115: 18 k Ω (brown-gray-orange).

(✓) R113: 1000 Ω (brown-black-red).

(✓) R123: 33 k Ω (orange-orange-orange).

(✓) R121: 33 k Ω (orange-orange-orange).

(✓) R122: 15 k Ω (brown-green-orange).

() Solder the leads to the foil and cut off the excess lead lengths.

(✓) R138: 100 M Ω (brown-black-violet).

(✓) R139: 100 M Ω (brown-black-violet).

(✓) R141: 100 M Ω (brown-black-violet).

(✓) R134: 100 k Ω (brown-black-yellow).

(✓) R142: 100 M Ω (brown-black-violet).

(✓) R125: 33 k Ω (orange-orange-orange).

(✓) R116: 33 k Ω (orange-orange-orange).

(✓) R127: 33 k Ω (orange-orange-orange).

(✓) R129: 33 k Ω (orange-orange-orange).

(✓) R128: 15 k Ω (brown-green-orange).

() Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 1-1

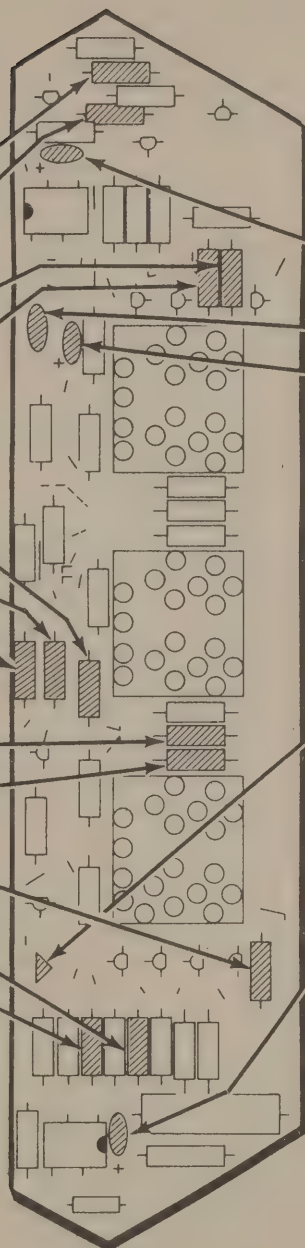
CONTINUE



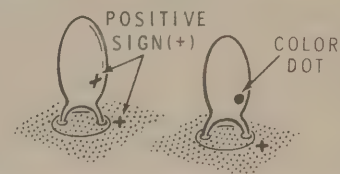
START



- (✓) R114: 47 k Ω (yellow-violet-orange).
- (✓) R112: 18 k Ω (brown-gray-orange).
- (✓) R118: 33 k Ω (orange-orange-orange).
- (✓) R119: 15 k Ω (brown-green-orange).
- (✓) R135: 100 k Ω (brown-black-yellow).
- (✓) R145: 470 k Ω (yellow-violet-yellow).
- (✓) R146: 39 k Ω (orange-white-orange).
- () Solder the leads to the foil and cut off the excess lead lengths.
- (✓) R143: 100 M Ω (brown-black-violet).
- (✓) R144: 100 M Ω (brown-black-violet).
- () R131: 15 k Ω (brown-green-orange).
- (✓) R117: 15 k Ω (brown-green-orange).
- (✓) R126: 12 k Ω (brown-red-orange).
- (✓) Solder the leads to the foil and cut off the excess lead lengths.



NOTE: When you install a tantalum capacitor, always match the positive (+) or dot marked side of the capacitor with the positive (+) mark on the circuit board.

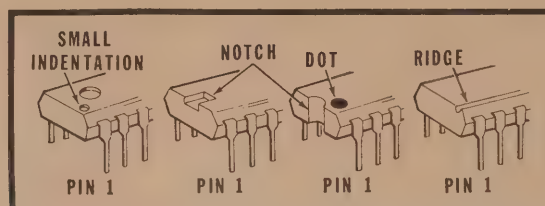


- (✓) C103: 10 μ F tantalum.
- (✓) C102: .005 μ F disc.
- (✓) C104: 10 μ F tantalum.
- () Solder the leads to the foil and cut off the excess lead lengths.
- (✓) R103: 470 k Ω control. Solder the pins to the foil.



- (✓) C105: 10 μ F tantalum.
- () Solder the leads to the foil and cut off the excess lead lengths.

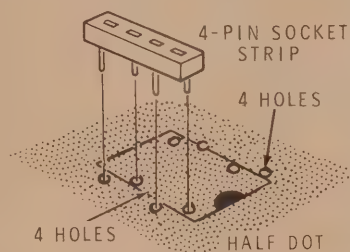
PICTORIAL 1-2

**START**

NOTE: Either end of the 4-pin socket strip may be positioned toward the half-dot mark of the IC outline on the circuit board.

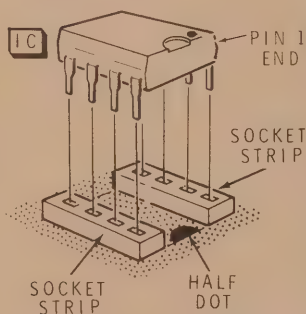
1. (✓) Two 4-pin socket strips at IC102.

Place either end of one 4-pin socket strip over one group of holes in the IC outline. Insert the pins into the circuit board holes and solder the pins to the foil. DO NOT cut off the excess pin lengths.



In a like manner, mount another 4-pin socket strip in the remaining four circuit board holes in the IC outline.

2. (✓) IC102: NE555 integrated circuit. Refer to Detail 1-3A and position the pin 1 end of the integrated circuit over the half dot mark on the circuit board. Then insert the integrated circuit pins into their corresponding socket holes and press the integrated circuit down into the socket.



- (✓) In a like manner, install two 4-pin socket strips and an NE555 integrated circuit at IC101.

Detail 1-3A

NOT USED

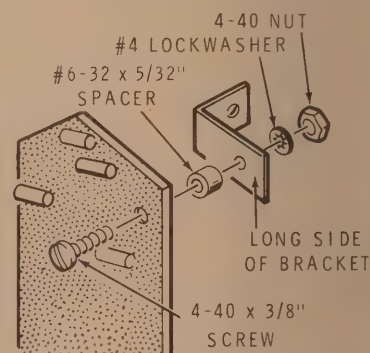
PICTORIAL 1-3

CONTINUE

NOTES:

1. Use the plastic nut starter supplied with this kit to hold and start 6-32 nuts on screws.
2. Two angle brackets will be installed on this circuit board.

- () Angle bracket on foil side of circuit board. Use a 4-40 x 3/8" screw, a #6 x 5/32" spacer, a #4 lockwasher, and a 4-40 nut.



- () Connector pins at FA and FB. Be sure the pins are straight; then solder the pins to the foil.

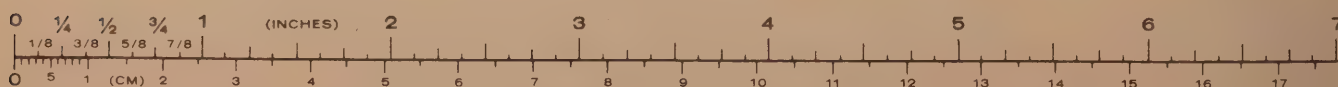


- (✓) Eighteen connector pins at V101. Be sure the pins are straight and even; then solder them to the foil.

- (✓) Eighteen connector pins at V102. Be sure the pins are straight and even; then solder them to the foil.

- (✓) Nineteen connector pins at V103. Be sure the pins are straight and even; then solder them to the foil.

- () Angle bracket on foil side of circuit board. Use a 4-40 x 3/8" screw, a #6 x 5/32" spacer, a #4 lockwasher, and a 4-40 nut.



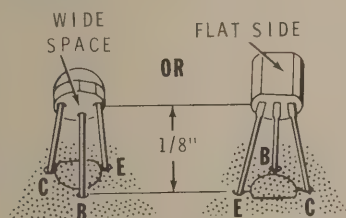
START

FOR GOOD SOLDER CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN.

WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.



NOTE: When you install a transistor, refer to the following diagram to determine which type of transistor you have. Then bend the E, B, and C leads of the transistor to fit into the corresponding E, B, and C holes in the circuit board. Solder the leads to the foil and cut off the excess lead lengths.



Install MPS-A20 transistors (#417-801) at the following locations.

- (✓) Q103.
- (✓) Q102.
- (✓) Q104.

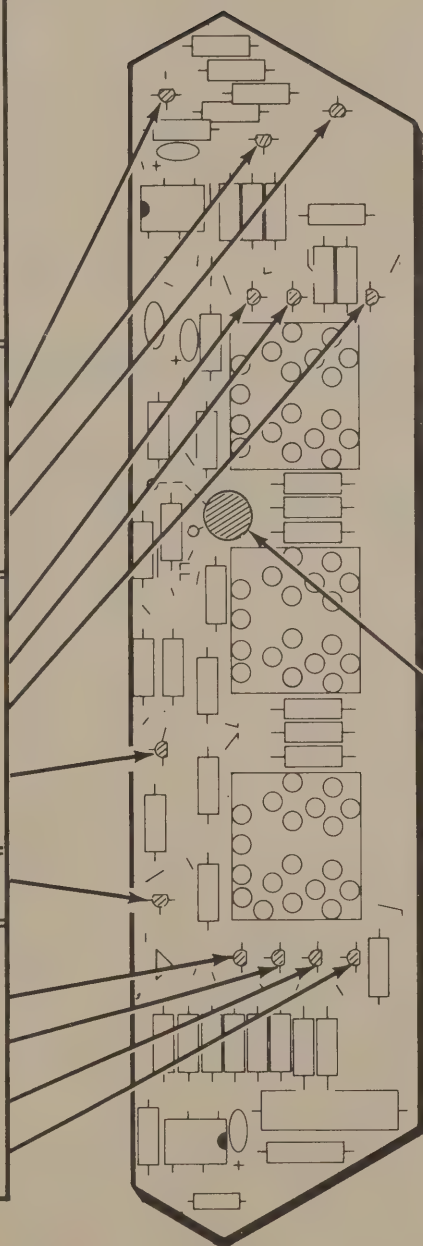
Install MPS-A42 transistors (#417-294) at the following locations.

- (✓) Q108.
- (✓) Q109.
- (✓) Q111.
- (✓) Q113.

(✓) Q101: MPS-A20 transistor (#417-801).

Install MPS-A42 transistors (#417-294) at the following locations.

- (✓) Q107.
- (✓) Q112.
- (✓) Q106.
- (✓) Q105.

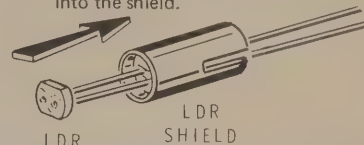


PICTORIAL 1-4

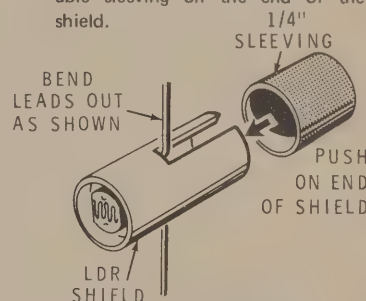
CONTINUE



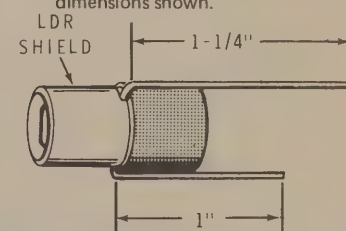
- () Insert the leads of the LDR (light dependent resistor) into the LDR shield as shown. Then press the LDR into the shield.



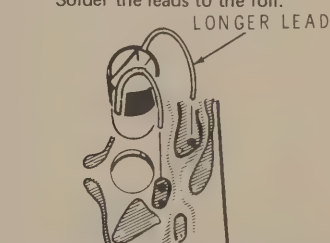
- () Bend the leads out as shown. Then press a 1/4" length of heat shrinkable sleeving on the end of the shield.



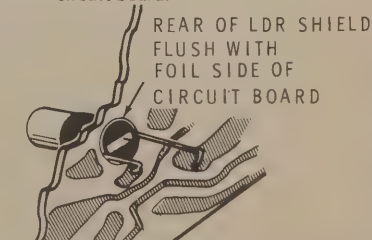
- () Bend the leads parallel to the LDR shield. Then cut the leads to the dimensions shown.



- () LDR101: Bend the LDR leads as shown. Then install the LDR from the foil side of the circuit board. Solder the leads to the foil.



- () Adjust the LDR until the rear of the LDR is flush with the foil side of the circuit board.



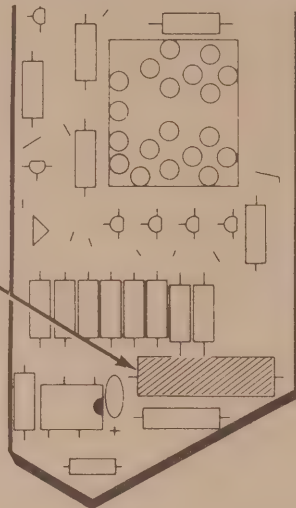
START

GC-1092A - 60 Hz ONLY
OR
GC-1092AE - 60 Hz ONLY

NOTE: Perform the next two steps if you are building the Model GC-1092A clock which only operates from a 120-volt, 60 Hz power source, or the Model GC-1092AE clock which will be operated from a 60 Hz power source of 120 or 240 volts.

- () C101: .01 μ F polystyrene capacitor.
 NOTE: Disregard the position of the banded end.

- () Solder the leads to the foil and cut off the excess lead lengths.

**CONTINUE****CIRCUIT BOARD CHECKOUT**

Carefully inspect the circuit board for the following conditions.

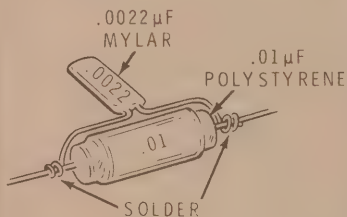
- () Unsoldered connections.
- () "Cold" solder connections.
- () Solder bridges between foil patterns.
- () Protruding leads which could touch together.
- () IC's for proper positioning and installation.
- () Transistors for the proper type and installation.
- () Tantalum capacitors for the correct position of the positive (+) end.

FINISH**START**

GC-1092AE ONLY
120-240 VAC, 50 Hz ONLY

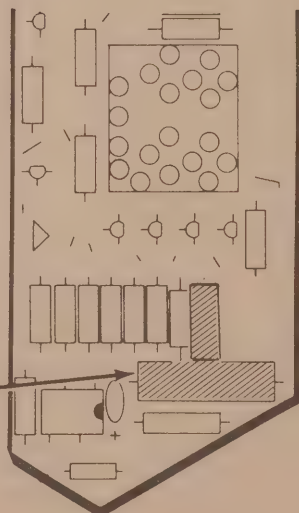
NOTE: Perform the next three steps only if you are building the Model GC-1092AE clock for operation from a 50 Hz power source.

- () Prepare a 2-capacitor combination as shown.



- () C101 (.01 μ F polystyrene) and C106 (.0022 Mylar) combination. NOTE: Disregard the position of the banded end of the .01 μ F capacitor.

- () Solder the leads to the foil and cut off the excess lead lengths.

**CONTINUE****CIRCUIT BOARD CHECKOUT**

Carefully inspect the circuit board for the following conditions.

- () Unsoldered connections.
- () "Cold" solder connections.
- () Solder bridges between foil patterns.
- () Protruding leads which could touch together.
- () IC's for proper positioning and installation.
- () Transistors for the proper type and installation.
- () Tantalum capacitors for the correct position of the positive (+) end.

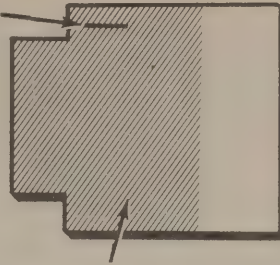
FINISH

PICTORIAL 1-5

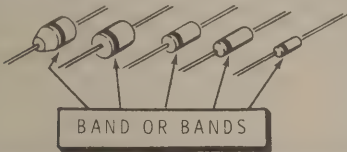
START



IDENTIFICATION DRAWING

PART
NUMBER

The steps performed in this Pictorial are in
this area of the circuit board.

Position the main circuit board as shown.
Then perform each step in the order listed.

NOTE: DIODES MAY BE SUPPLIED
IN ANY OF THE FOLLOWING SHAPES.
ALWAYS POSITION THE BANDED END
AS SHOWN ON THE CIRCUIT BOARD.


BAND OR BANDS

(✓) D209: VR-16.1G diode (#56-36).

(✓) D203: 1N2071 diode (#57-27).

(✓) D201: 1N2071 diode (#57-27).

(✓) D202: 1N2071 diode (#57-27).

(✓) D207: 1N4002 diode (#57-65).

(✓) D208: 1N4002 diode (#57-65).

(✓) D211: 1N4002 diode (#57-65).

(✓) D215: 1N4149 diode (#56-56).

(✓) D216: 1N4149 diode (#56-56).

(✓) D212: 1N4002 diode (#57-65).

(✓) D214: 1N4149 diode (#56-56).

(✓) D213: 1N716A diode (#56-57).

NOTE: If diode #56-57 is color coded
violet-brown-blue, install it so the violet
color band is toward the banded end of
the diode outline on the circuit board.

() Solder the leads to the foil and cut
off the excess lead lengths.

CONTINUE



(✓) D231: 1N4149 diode (#56-56).

(✓) D229: 1N4149 diode (#56-56).

(✓) D224: 1N4149 diode (#56-56).

(✓) D226: 1N4149 diode (#56-56).

(✓) D227: 1N4149 diode (#56-56).

() Solder the leads to the foil and cut
off the excess lead lengths.

(✓) D228: 1N4149 diode (#56-56).

(✓) D223: 1N4149 diode (#56-56).

(✓) D225: 1N4149 diode (#56-56).

(✓) D222: 1N4149 diode (#56-56).

(✓) D221: 1N4149 diode (#56-56).

(✓) D219: 1N4149 diode (#56-56).

(✓) D218: 1N4149 diode (#56-56).

(✓) D217: 1N4149 diode (#56-56).

() Solder the leads to the foil and cut
off the excess lead lengths.

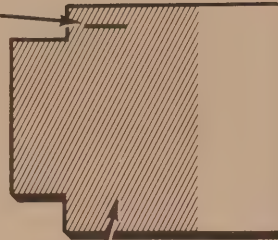
PICTORIAL 2-1

START



PART
NUMBER


IDENTIFICATION
DRAWING

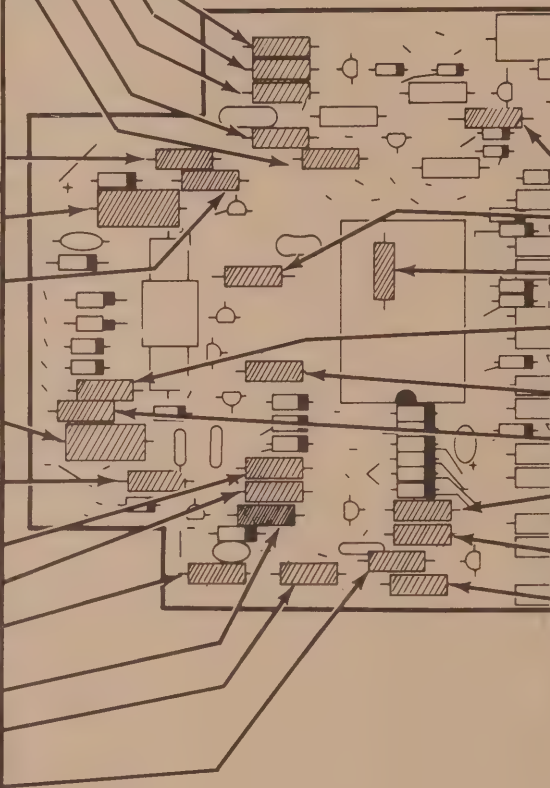


The steps performed in this Pictorial are in this area of the circuit board.

CONTINUE



- (✓) R252: 8200 Ω (gray-red-red).
- (✓) R251: 270 k Ω (red-violet-yellow).
- (✓) R249: 270 k Ω (red-violet-yellow).
- (✓) R259: 100 k Ω (brown-black-yellow).
- (✓) R258: 1200 Ω (brown-red-red).
- () Form the leads of a 24 k Ω precision resistor as shown.

- (✓) R208: 24 k Ω precision.
- () R202: 150 Ω , 1-watt (brown-green-brown).
- (✓) R209: 1130 Ω (1.13 k) precision.
- () Solder the leads to the foil and cut off the excess lead lengths.
- () R203: 680 Ω , 1-watt (blue-gray-brown).
- (✓) R206: 56 k Ω (green-blue-orange).
- (✓) R205: 27 k Ω (red-violet-orange).
- (✓) R207: 560 Ω (green-blue-brown).
- (✓) R213: 39 k Ω (orange-white-orange).
- (✓) R204: 1000 Ω (brown-black-red).
- (✓) R212: 2200 Ω (red-red-red).
- (✓) R218: 3900 Ω (orange-white-red).
- () Solder the leads to the foil and cut off the excess lead lengths.



- (✓) R253: 180 k Ω (brown-gray-yellow).
- (✓) R211: 10 k Ω (brown-black-orange).
- (✓) R217: 18 k Ω (brown-gray-orange).
- (✓) R214: 100 k Ω (brown-black-yellow).
- (✓) R216: 47 k Ω (yellow-violet-orange).
- (✓) R215: 18 k Ω (brown-gray-orange).
- (✓) R221: 120 k Ω (brown-red-yellow).
- (✓) R219: 12 k Ω (brown-red-orange).
- (✓) R222: 82 k Ω (gray-red-orange).
- () Solder the leads to the foil and cut off the excess lead lengths.

PICTORIAL 2-2

START



FOR GOOD SOLDER CONNECTIONS, YOU MUST **KEEP THE SOLDERING IRON TIP CLEAN.** WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.



IDENTIFICATION DRAWING

PART NUMBER



The steps performed in this Pictorial are in this area of the circuit board.

CONTINUE



(✓) R254: 100 k Ω (brown-black-yellow).

(✓) R240: 1 M Ω (brown-black-green).

(✓) R224: 22 k Ω (red-red-orange).

(✓) R223: 100 k Ω (brown-black-yellow).

(✓) R228: 22 k Ω (red-red-orange).

(✓) R227: 100 k Ω (brown-black-yellow).

(✓) R233: 22 k Ω (red-red-orange).

() Solder the leads to the foil and cut off the excess lead lengths.

(✓) R232: 100 k Ω (brown-black-yellow).

(✓) R237: 22 k Ω (red-red-orange).

(✓) R236: 100 k Ω (brown-black-yellow).

(✓) R242: 22 k Ω (red-red-orange).

(✓) R241: 100 k Ω (brown-black-yellow).

(✓) R246: 22 k Ω (red-red-orange).

() R245: 100 k Ω (brown-black-yellow).

() Solder the leads to the foil and cut off the excess lead lengths.

(✓) R256: 3300 Ω (orange-orange-red).

(✓) R255: 100 k Ω (brown-black-yellow).

(✓) R257: 180 k Ω (brown-gray-yellow).

(✓) R225: 100 k Ω (brown-black-yellow).

(✓) R226: 220 k Ω (red-red-yellow).

(✓) R229: 100 k Ω (brown-black-yellow).

(✓) R231: 220 k Ω (red-red-yellow).

(✓) R234: 100 k Ω (brown-black-yellow).

() Solder the leads to the foil and cut off the excess lead lengths.

(✓) R235: 220 k Ω (red-red-yellow).

(✓) R238: 100 k Ω (brown-black-yellow).

(✓) R239: 220 k Ω (red-red-yellow).

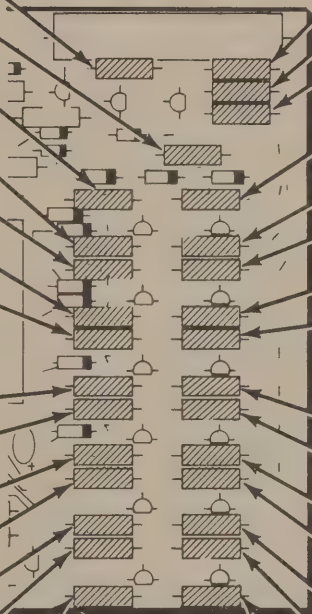
(✓) R243: 100 k Ω (brown-black-yellow).

(✓) R244: 220 k Ω (red-red-yellow).

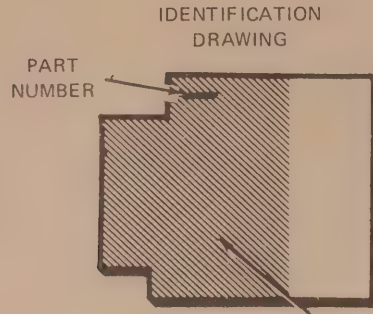
(✓) R247: 100 k Ω (brown-black-yellow).

(✓) R248: 220 k Ω (red-red-yellow).

() Solder the leads to the foil and cut off the excess lead lengths.



PICTORIAL 2-3



The steps performed in this Pictorial are in this area of the circuit board.

START ↓

(/) C210: .047 μ F(K) Mylar.

(:) C208: 50 pF mica.

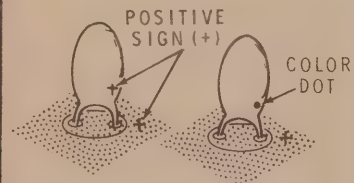
(✓) C202: .02 μ F disc.

(✓) C204: .001 μ F disc.

(") C205: .01 μ F Mylar.

(|) C209: .01 μ F Mylar.

NOTE: When you install a tantalum capacitor, always match the positive (+) or dot marked side of the capacitor with the positive (+) mark on the circuit board.

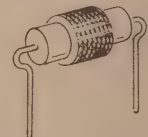


(\) C206: 10 μ F tantalum.

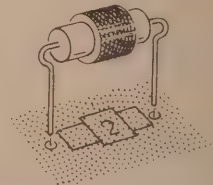
() Solder the leads to the foil and cut off the excess lead lengths.

CONTINUE ↓

() Form the leads of the 2 mH choke (#45-84) as shown.



(✓) L201: 2 mH choke (#45-84).



(✓) C207: 10 μ F tantalum.

() Solder the leads to the foil and cut off the excess lead lengths.

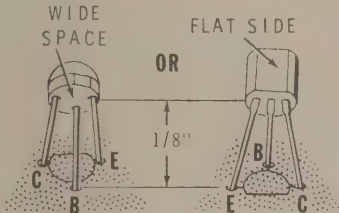
PICTORIAL 2-4

START

FOR GOOD SOLDER CONNECTIONS, YOU MUST KEEP THE SOLDERING IRON TIP CLEAN.

WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH

NOTE: When you install a transistor, refer to the following diagram to determine which type of transistor you have. Then bend the E, B, and C leads of the transistor to fit into the corresponding E, B, and C holes in the circuit board. Solder the leads to the foil and cut off the excess lead lengths.



Install MPS-A20 transistors (#417-801) at the following locations.

(✓) Q204.

(✓) Q224.

(✓) Q203: 2N3643 transistor (#417-233).

Install MPS-A20 transistors (#417-801) at the following locations.

(✓) Q206.

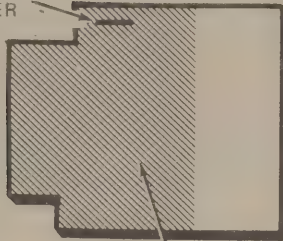
(✓) Q202.

(✓) Q201.

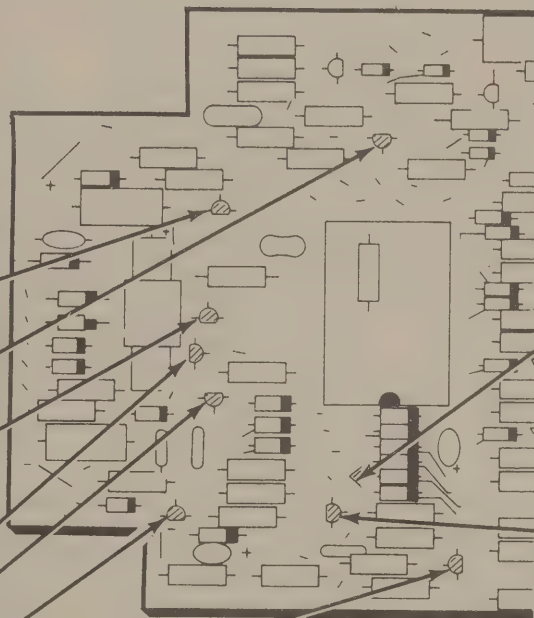
(✓) Q207.

IDENTIFICATION DRAWING

PART NUMBER



The steps performed in this Pictorial are in this area of the circuit board.

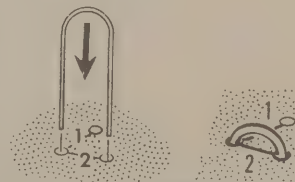


CONTINUE

() Use a cutoff resistor lead and prepare a U-shaped jumper as shown.



(✓) Install the U-shaped jumper at 2 on the circuit board. Solder the leads to the foil and cut off the excess lead lengths.

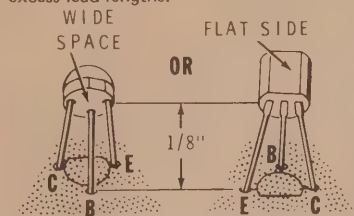


(✓) Q205: 2N4121 transistor (#417-235).

PICTORIAL 2-5

START

NOTE: When you install a transistor, line up the flat on the transistor with the outline of the flat on the circuit board. Then insert the E, B, and C leads of the transistor into the corresponding E, B, and C holes in the circuit board. Position the transistor 1/8" above the circuit board. Solder the leads to the foil and cut off the excess lead lengths.



(✓) Q222: MPS-A20 transistor (#417-801).

(✓) Q223: 2N4121 transistor (#417-235).

Install MPS-A42 transistors (#417-294) at the following locations.

(✓) Q208.

(✓) Q211.

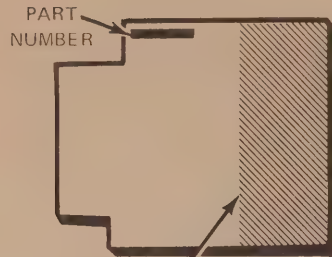
(✓) Q213.

(✓) Q215.

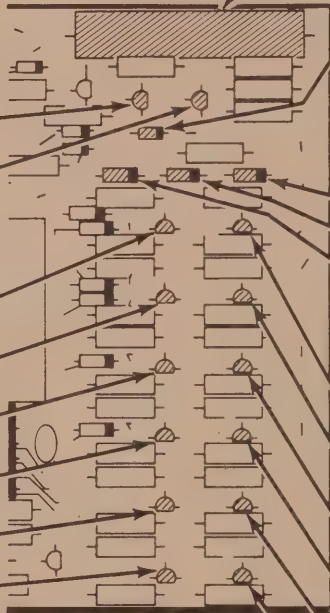
(✓) Q217.

(✓) Q219.

IDENTIFICATION
DRAWING



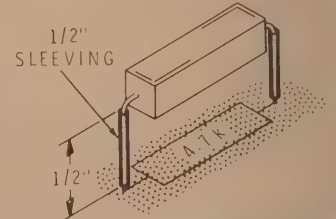
The steps performed in this Pictorial are in this area of the circuit board.



PICTORIAL 2-6

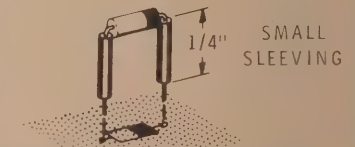
CONTINUE

(✓) R201: 4700 Ω (4.7K), 7-watt resistor. Place 1/2" of small sleeving on each lead as shown.



(✓) D232: 1N4149 diode (#56-56). Position the banded end as shown.

NOTE: Use 1/4" lengths of small sleeving on each lead of the following 3 diodes. Position the banded ends as shown.



(✓) D204: ZVR-68 diode (#56-68).

(✓) D205: ZVR-68 diode (#56-68).

(✓) D206: ZVR-68 diode (#56-68).

() Solder the leads to the foil and cut off the excess lead lengths.

Install MPS-L51 transistors (#417-295) at the following locations: Solder each transistor as it is installed and cut off the excess lead lengths.

(✓) Q209.

(✓) Q212.

(✓) Q214.

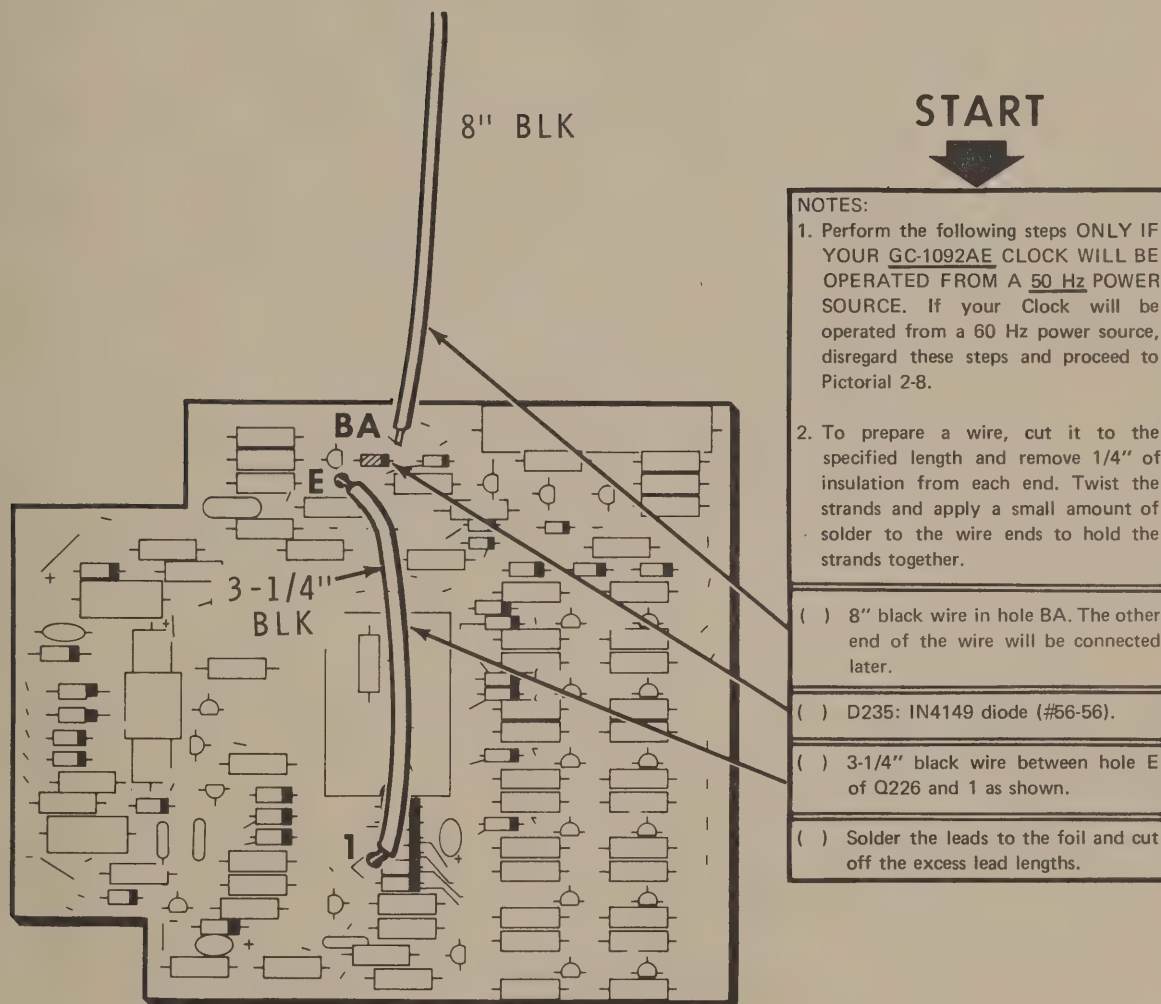
(✓) Q216.

(✓) Q218.

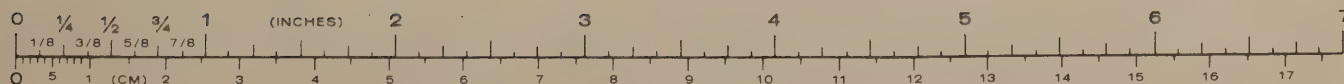
(✓) Q221.

NOTE: If you are building the Model GC-1092A clock, disregard the steps on Page 25 and proceed to Page 26.

GC-1092AE ONLY **FOR OPERATION FROM 50Hz POWER SOURCE**



PICTORIAL 2-7

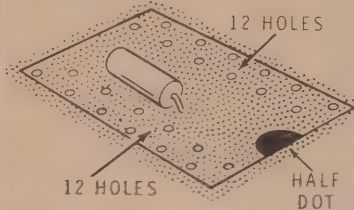


START



- () Locate the 12-pin socket strips.

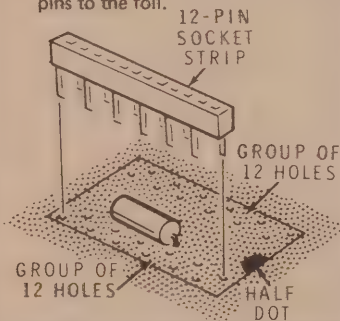
- () Find the IC201 identification on the circuit board. Note the two groups of staggered holes with twelve holes in each group.



NOTE: Either end of the 12-pin socket strips may be positioned toward the half-dot mark of the IC outline on the circuit board.

Two 12-pin socket strips at IC201.

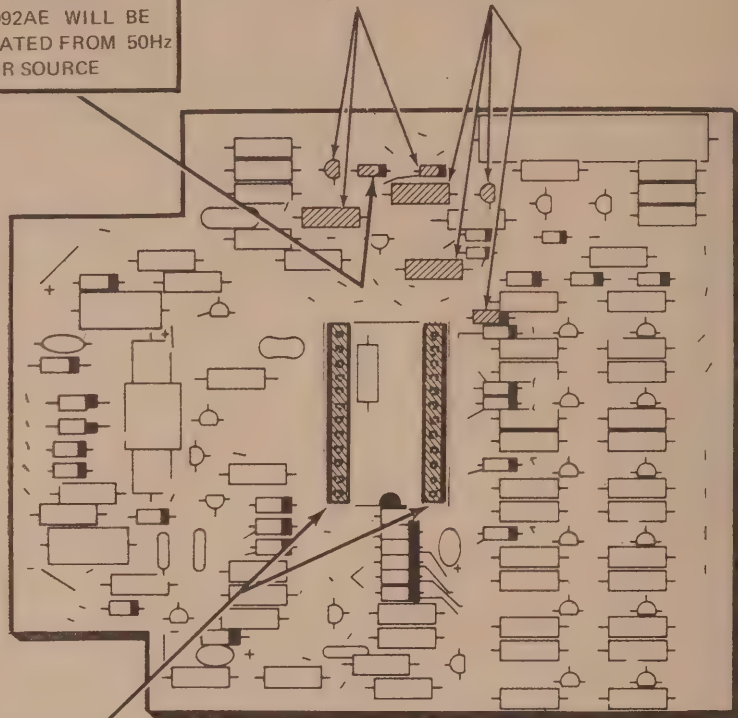
- () Place one 12-pin socket strip over one group of 12 holes in the IC outline. Insert the pins into the holes and solder the pins to the foil. DO NOT cut off the excess pin lengths. CAUTION: Be sure all of the socket pins are in the circuit board holes before you solder the pins to the foil.



- () In a like manner, mount another 12-pin socket strip in the remaining 12 holes in the IC outline.

DIODE MOUNTED HERE ONLY WHEN MODEL GC-1092AE WILL BE OPERATED FROM 50Hz POWER SOURCE

NO PARTS MOUNTED AT THESE LOCATIONS



CONTINUE



CIRCUIT BOARD CHECKOUT

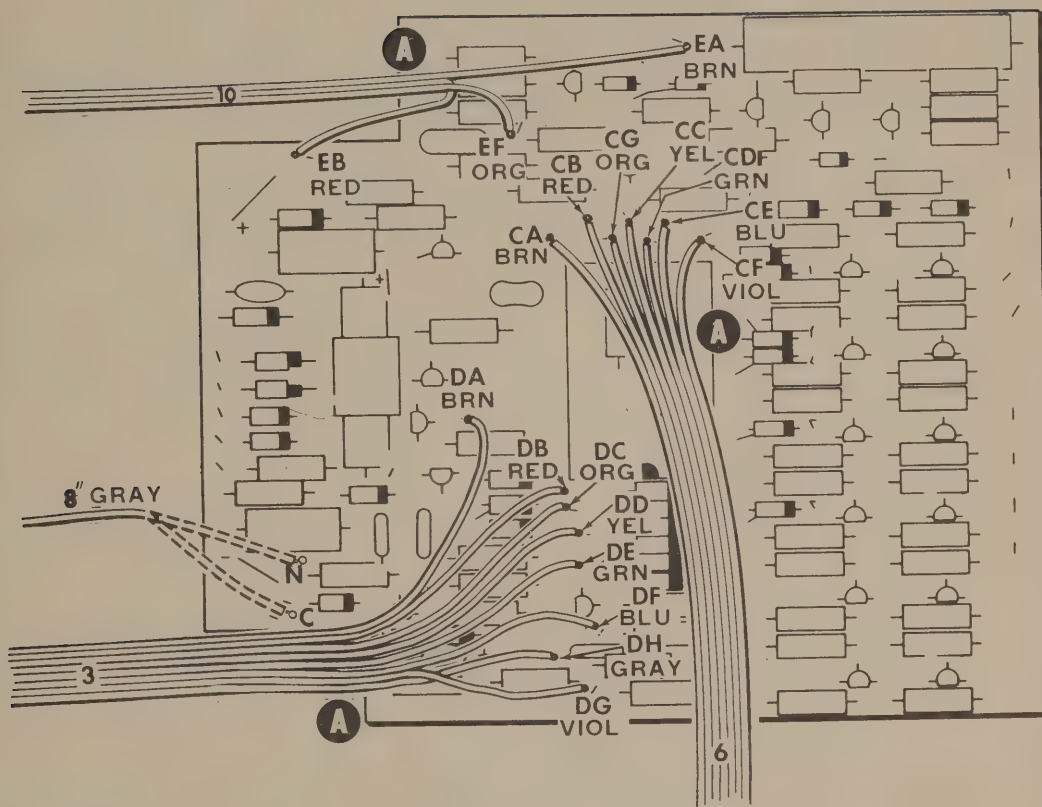
Carefully inspect the circuit board for the following conditions.

- () Unsoldered connections.
- () "Cold" solder connections.
- () Solder bridges between foil patterns.
- () Protruding leads which could touch together.
- () Diodes for the correct position of the banded end. NOTE: Each diode on this circuit board MUST be installed so its banded end is toward the right, as shown in the Pictorial.
- () IC for proper positioning and installation.
- () Transistors for the proper type and installation.
- () Tantalum capacitor for the correct position of the positive (+) lead.

PICTORIAL 2-8

FINISH





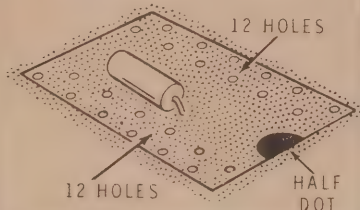
PICTORIAL 2-11

START



- () Locate the 12-pin socket strips.

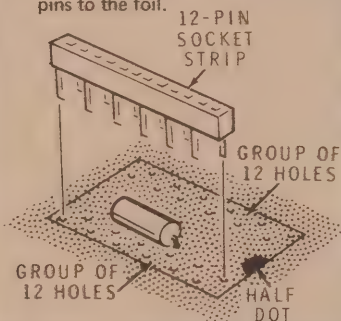
- () Find the IC201 identification on the circuit board. Note the two groups of staggered holes with twelve holes in each group.



NOTE: Either end of the 12-pin socket strips may be positioned toward the half-dot mark of the IC outline on the circuit board.

Two 12-pin socket strips at IC201.

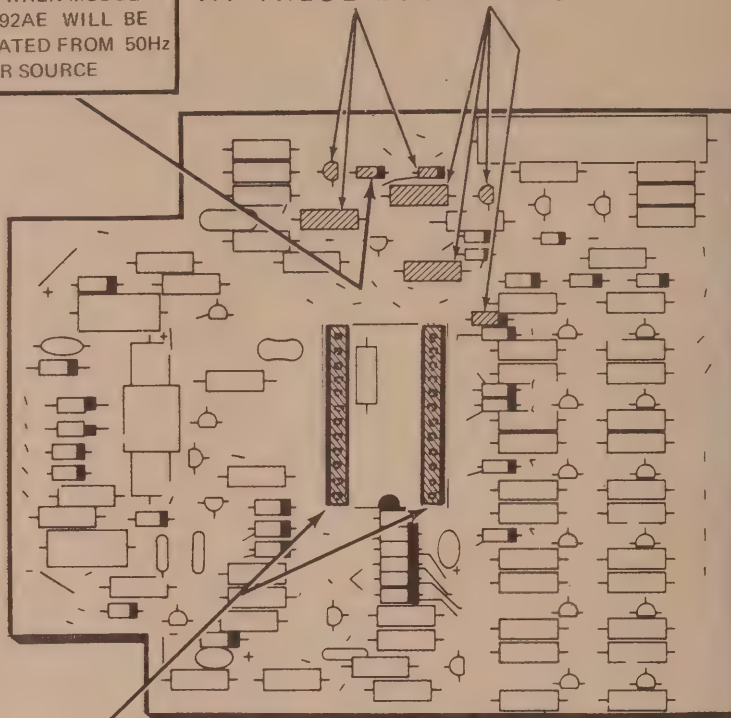
- () Place one 12-pin socket strip over one group of 12 holes in the IC outline. Insert the pins into the holes and solder the pins to the foil. DO NOT cut off the excess pin lengths. CAUTION: Be sure all of the socket pins are in the circuit board holes before you solder the pins to the foil.



- () In a like manner, mount another 12-pin socket strip in the remaining 12 holes in the IC outline.

DIODE MOUNTED HERE ONLY WHEN MODEL GC-1092AE WILL BE OPERATED FROM 50Hz POWER SOURCE

NO PARTS MOUNTED AT THESE LOCATIONS



CONTINUE



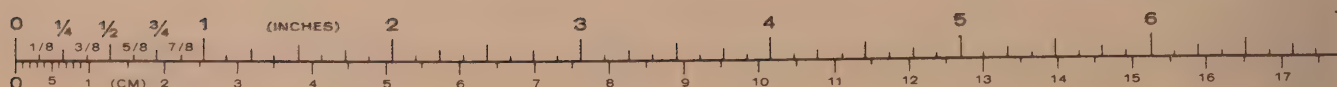
CIRCUIT BOARD CHECKOUT

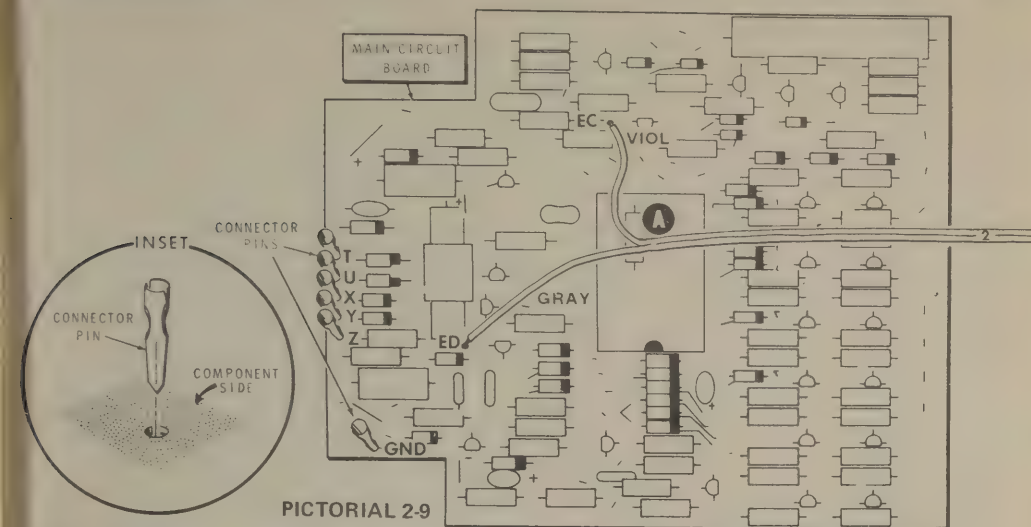
Carefully inspect the circuit board for the following conditions.

- () Unsoldered connections.
- () "Cold" solder connections.
- () Solder bridges between foil patterns.
- () Protruding leads which could touch together.
- () Diodes for the correct position of the banded end. NOTE: Each diode on this circuit board MUST be installed so its banded end is toward the right, as shown in the Pictorial.
- () IC for proper positioning and installation.
- () Transistors for the proper type and installation.
- () Tantalum capacitor for the correct position of the positive (+) lead.

PICTORIAL 2-8

FINISH





Refer to Pictorial 2-9 for the following steps.

NOTE: In the following steps, (NS) means not to solder because another wire (or wires) will be added later. The letter S with a number, such as (S-3), means to solder the connection. The number that follows the letter S tells the number of connections to be soldered.

Refer to the inset drawing on Pictorial 2-9 and install connector pins on the component side of the main circuit board at the following six locations. Then solder the pins to the foil.

- (✓) Connector pin at T (S-1).
- (✓) Connector pin at U (S-1).
- (✓) Connector pin at X (S-1).
- (✓) Connector pin at Y (S-1).
- (✓) Connector pin at Z (S-1).
- (✓) Connector pin at GND (S-1).

NOTES:

1. Details 2-9A and 2-9B (fold-out from this page) are full-size drawings. Use these drawings to measure the wires when you prepare the following cables.
2. After the cable wires have been cut to the proper lengths, remove 1/4" of insulation from each end of

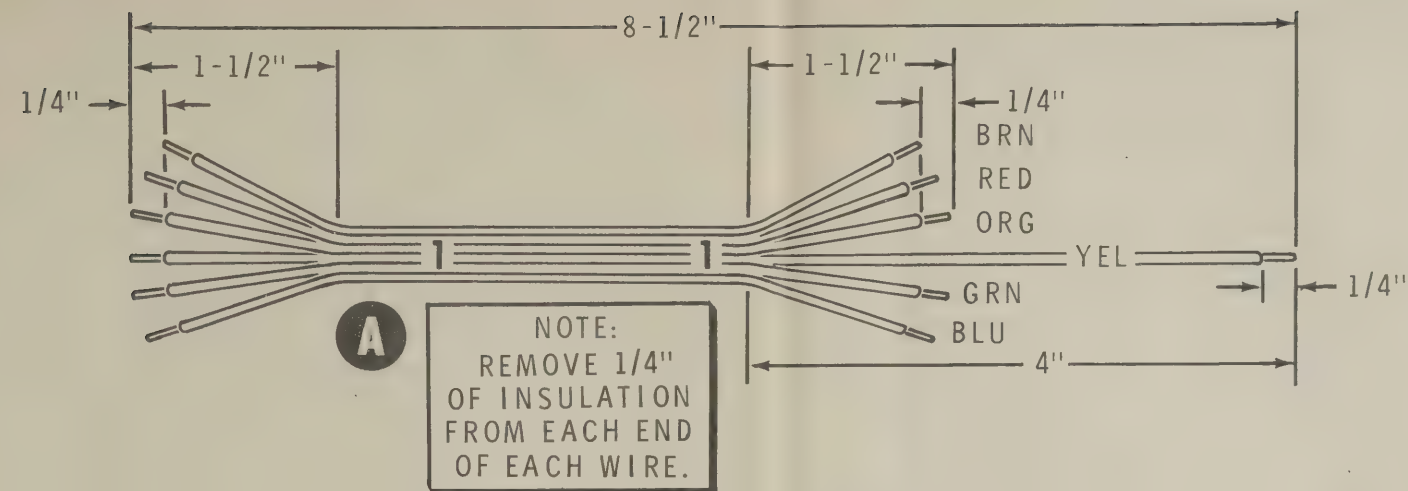
each wire. Then twist the fine strands together and apply a small amount of solder to each wire end to hold the strands together.

3. Two strips of numbers are provided so you can number each cable as it is prepared. To mark a cable, cut the proper number off a strip: Then remove the backing paper from the number. Press the number firmly on the cable at the two locations shown in the cable Detail.
- () Cut an 8-1/2" length of 8-wire cable and, as a pair, remove the violet and gray wires.
- () Refer to Detail 2-9A (fold-out from this page) and prepare the 6-wire cable as shown. Mark this cable #1 at the two indicated locations. Then set the cable aside until it is called for in a step.
- () Refer to Detail 2-9B and prepare the 2-wire cable as shown. Mark this cable #2 at the two indicated locations.

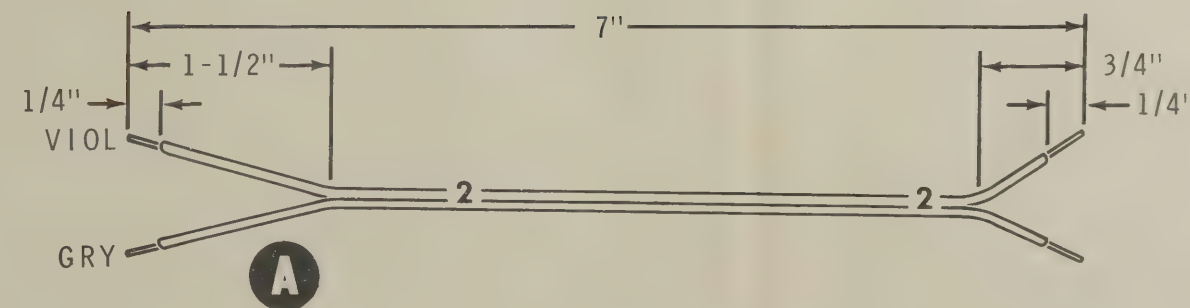
Refer to Pictorial 2-9 and connect cable #2, end A, to the main circuit board as follows:

- (✓) Gray wire to hole ED (S-1).
- (✓) Violet wire to hole EC (S-1).

The other end of the cable will be connected later.



Detail 2-9A



Detail 2-9B

Refer to Pictorial 2-10 for the following steps.

NOTE: The electrolytic capacitors, that you will install in the following steps, will be mounted on the foil side of the main circuit board.

- () Straighten the leads of the 1200 μ F and the 20 μ F electrolytic capacitors.
- () Cut two 1-1/2" lengths of foam tape.
- () Remove only the brown paper backing from the lengths of foam tape. Then, with the printing on the capacitor turned up, press the electrolytic capacitors on the lengths of tape as shown in inset #1 on the Pictorial. Press the capacitors down firmly onto the tape. **NOTE:** The tape should be curved around the capacitor body.

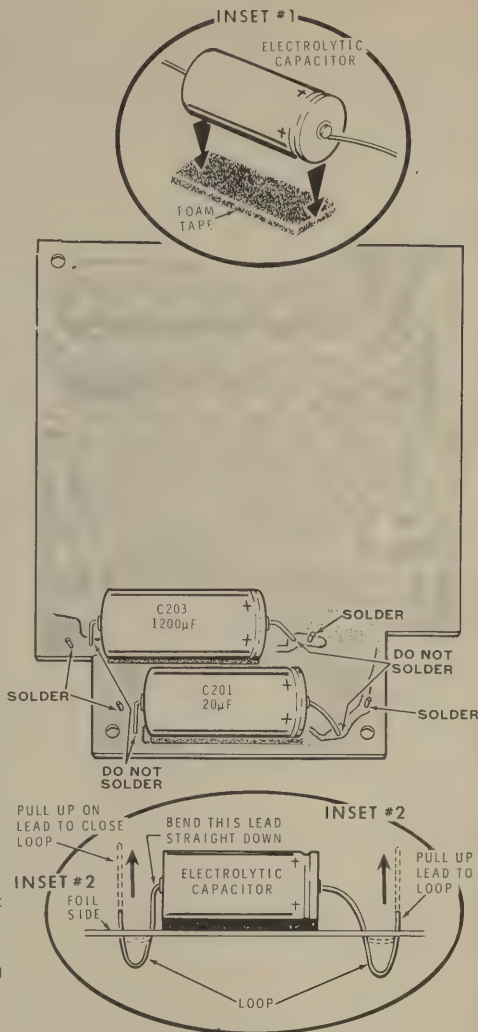
NOTES:

1. The outlined foils on Pictorial 2-10 show the lead locations of electrolytic capacitors C201 and C203. Note that each capacitor lead goes through one circuit board hole, and then bends and goes back through another circuit board hole to the foil side of the circuit board. Each lead will be soldered at only one circuit board hole.
2. The foam tape must be between the electrolytic capacitors and the circuit board foils.
3. Be sure you bend the negative lead of each capacitor straight down as shown in inset #2 before you install each capacitor in the circuit board. Note that only the positive end of the capacitor may be identified.

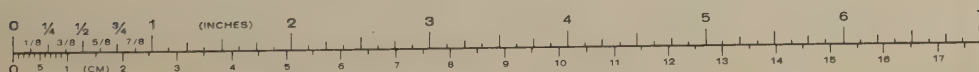
Install the electrolytic capacitors as follows:

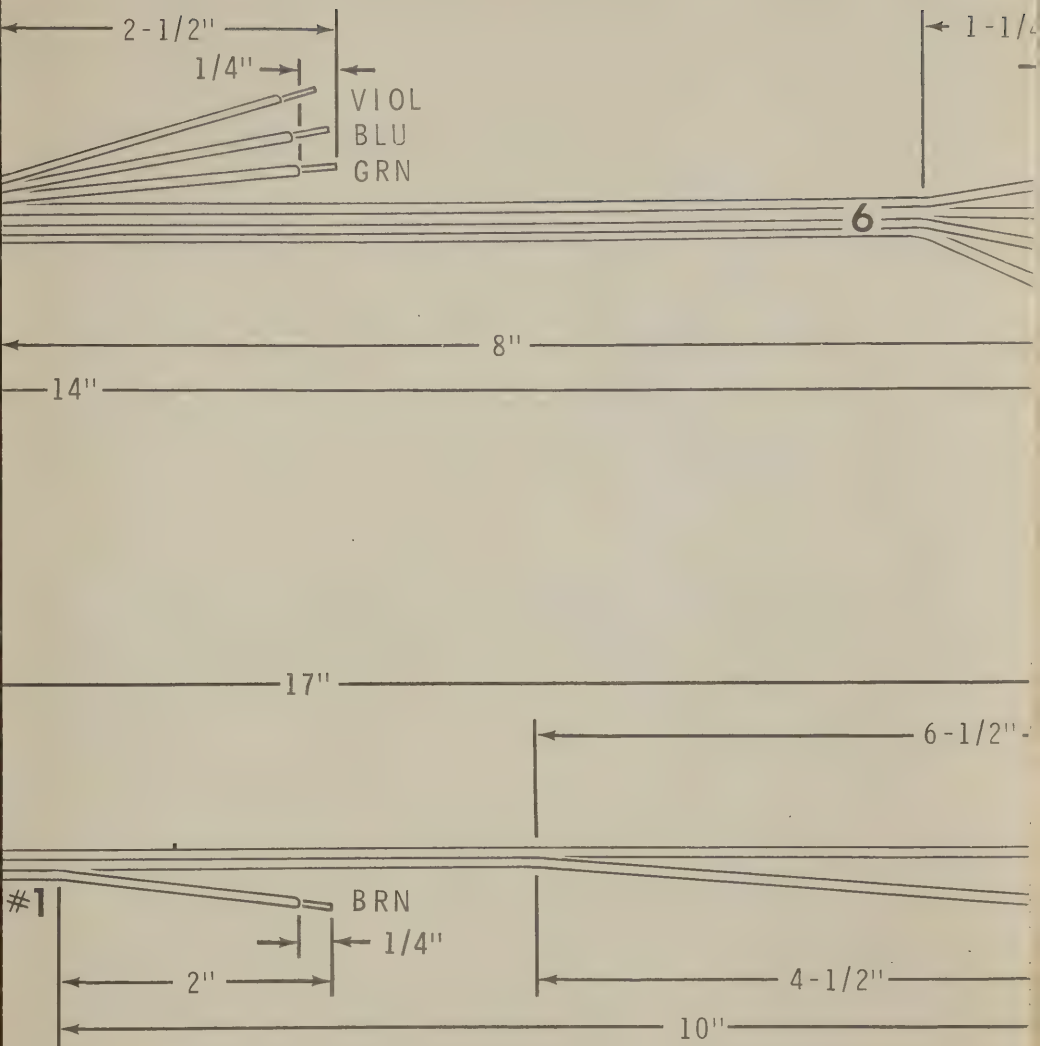
- (f) C203: 1200 μ F electrolytic (#25-241). See inset drawing #2.
- (v) C201: 20 μ F electrolytic (#25-16). See inset drawing #2.

Set the main circuit board aside until it is called for in a step.

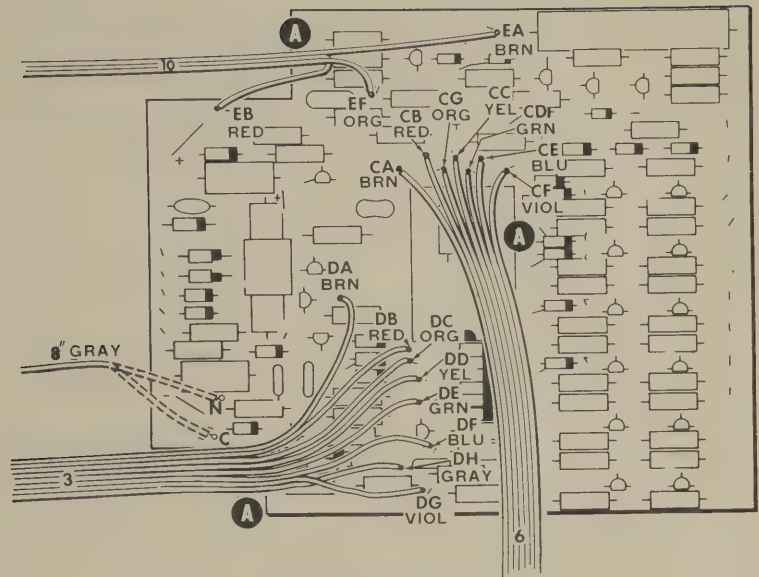


PICTORIAL 2-10





Detail 2-11C



PICTORIAL 2-11

PREPARING AND CONNECTING CABLES

NOTE: The other end of the wire and cables will be connected later.

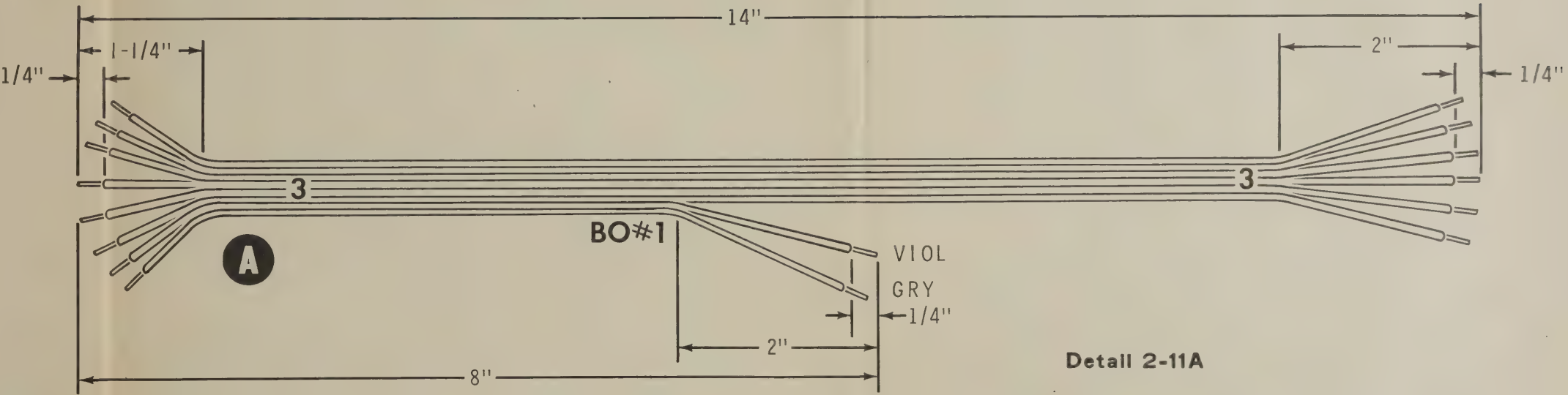
- NOTES:
1. The cable preparation Details are all full-size drawings as to length but NOT to width. Use the drawings to measure lengths when you prepare the cables.
 2. After the cable wires are cut to the proper lengths, remove 1/4" of insulation from each end of each wire. Twist the fine strands and apply a small amount of solder to the wire ends to hold the strands together.
 3. Save the cutoff lengths of wire for possible use later.
- () Cut a 14" length of 8-wire cable and prepare it as shown in Detail 2-11A (fold-out from this page). Mark this cable #3 at the two locations shown.

Connect the wires of cable #3 end A as follows:

- (✓) Brown to hole DA (S-1).
- (✓) Red to hole DB (S-1).
- (✓) Orange to hole DC (S-1).
- (✓) Yellow to hole DD (S-1).
- (✓) Green to hole DE (S-1).
- (✓) Blue to hole DF (S-1).
- (✓) Gray to hole DH (S-1).
- (✓) Violet to hole DG (S-1).

Refer to Pictorial 2-11 for the following steps.

In the following steps, one end of one wire and five cables will be connected to the main circuit board. Solder each wire to the circuit board foil as it is connected.



Detail 2-11A



- () Cut a 14" length of 8-wire cable and remove and save the gray wire. Then prepare the 7-wire cable as shown in Detail 2-11B. Mark this cable #6 at the two indicated locations.

Refer to Pictorial 2-11 (fold-out from Page 28) for the following steps.

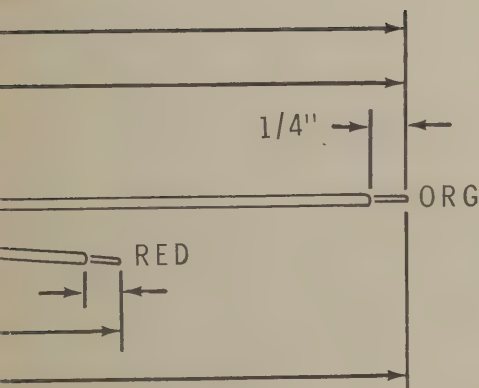
Connect the wires of cable #6 end A as follows:

- (✓) Brown to hole CA (S-1).
- (✓) Red to hole CB (S-1).
- (✓) Orange to hole CG (S-1).
- (✓) Yellow to hole CC (S-1).
- (✓) Green to hole CD (S-1).
- (✓) Blue to hole CE (S-1).
- (✓) Violet to hole CF (S-1).

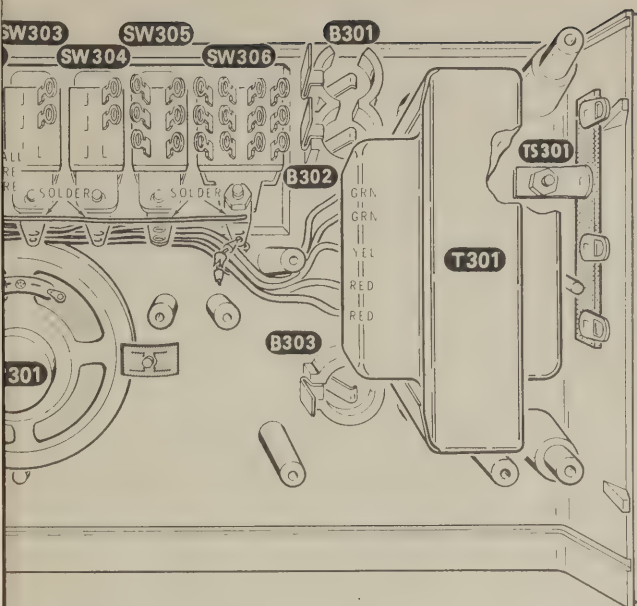
- (✓) Cut a 17" length of 8-wire cable and remove and save the gray wire. Then temporarily set the 7-wire cable aside.

- () Prepare an 8" length of this gray wire.

NOTE: In the next step, you will connect one end of the 8" gray wire in either hole N or hole C in the main circuit board. If you intend to use nickel-cadmium batteries in your clock, connect the gray wire in hole N. However, if you intend to use any other kind of batteries (the kind sold in most stores), connect the gray wire in hole C.



- (✓) Connect one end of the 8" gray wire in hole N or hole C (S-1). See dashed line on Pictorial 2-11.
- (✓) Split apart the 17" length of 7-wire cable between the blue and the green wires to form a 5-wire cable and a 2-wire cable. Set the 2-wire violet and blue cable aside until it is called for later.
- (✓) Split apart the 5-wire cable between the orange wire and the yellow wire to form a 2-wire cable and a 3-wire cable. Place the green and yellow 2-wire cable aside until it is called for later.
- (✓) Refer to Detail 2-11C (fold-out from this page) and prepare the brown, red, and orange 3-wire cable. Mark this cable #10 at the indicated locations.



PICTORIAL 3-1

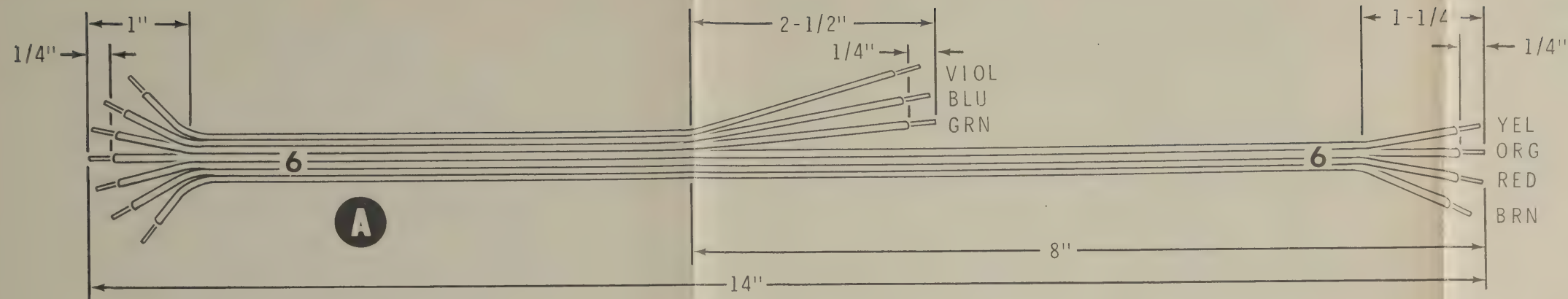
14"

2-1

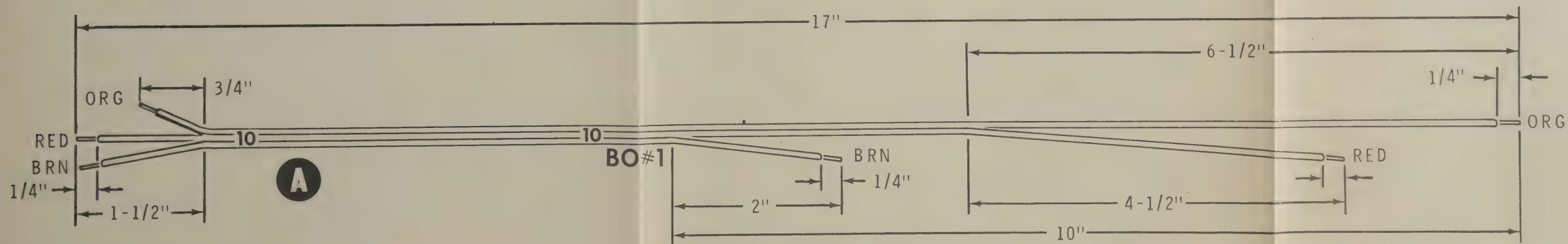
5

Detail 2-12B

A



Detail 2-11B



Detail 2-11C

- () Cut a 14" length of 8-wire cable and remove and save the gray wire. Then prepare the 7-wire cable as shown in Detail 2-11B. Mark this cable #6 at the two indicated locations.

Refer to Pictorial 2-11 (fold-out from Page 28) for the following steps.

Connect the wires of cable #6 end A as follows:

- () Brown to hole CA (S-1).
- (✓) Red to hole CB (S-1).
- (✓) Orange to hole CG (S-1).
- (✓) Yellow to hole CC (S-1).
- (✓) Green to hole CD (S-1).
- (✓) Blue to hole CE (S-1).
- () Violet to hole CF (S-1).

- () Cut a 17" length of 8-wire cable and remove and save the gray wire. Then temporarily set the 7-wire cable aside.

- () Prepare an 8" length of this gray wire.

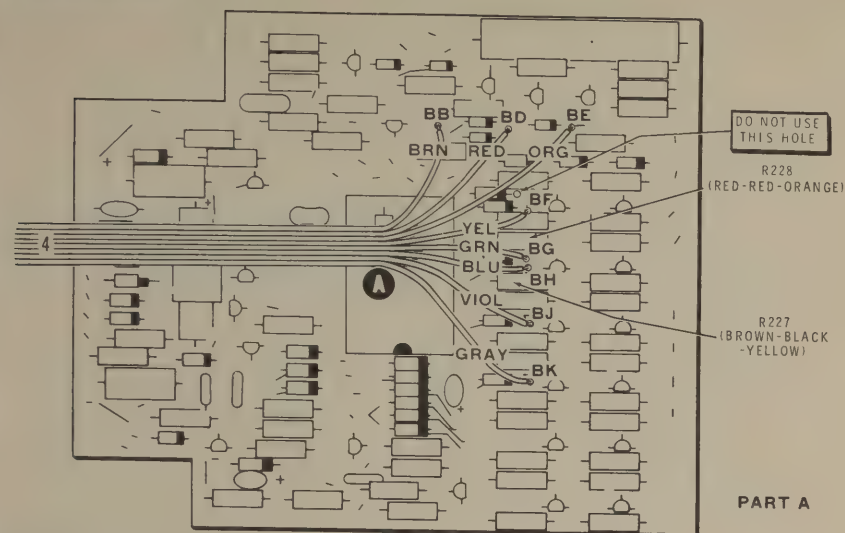
NOTE: In the next step, you will connect one end of the 8" gray wire in either hole N or hole C in the main circuit board. If you intend to use nickel-cadmium batteries in your clock, connect the gray wire in hole N. However, if you intend to use any other kind of batteries (the kind sold in most stores), connect the gray wire in hole C.

- (✓) Connect one end of the 8" gray wire in hole N or hole C (S-1). See dashed line on Pictorial 2-11.

- () Split apart the 17" length of 7-wire cable between the blue and the green wires to form a 5-wire cable and a 2-wire cable. Set the 2-wire violet and blue cable aside until it is called for later.

- () Split apart the 5-wire cable between the orange wire and the yellow wire to form a 2-wire cable and a 3-wire cable. Place the green and yellow 2-wire cable aside until it is called for later.

- (✓) Refer to Detail 2-11C (fold-out from this page) and prepare the brown, red, and orange 3-wire cable. Mark this cable #10 at the indicated locations.



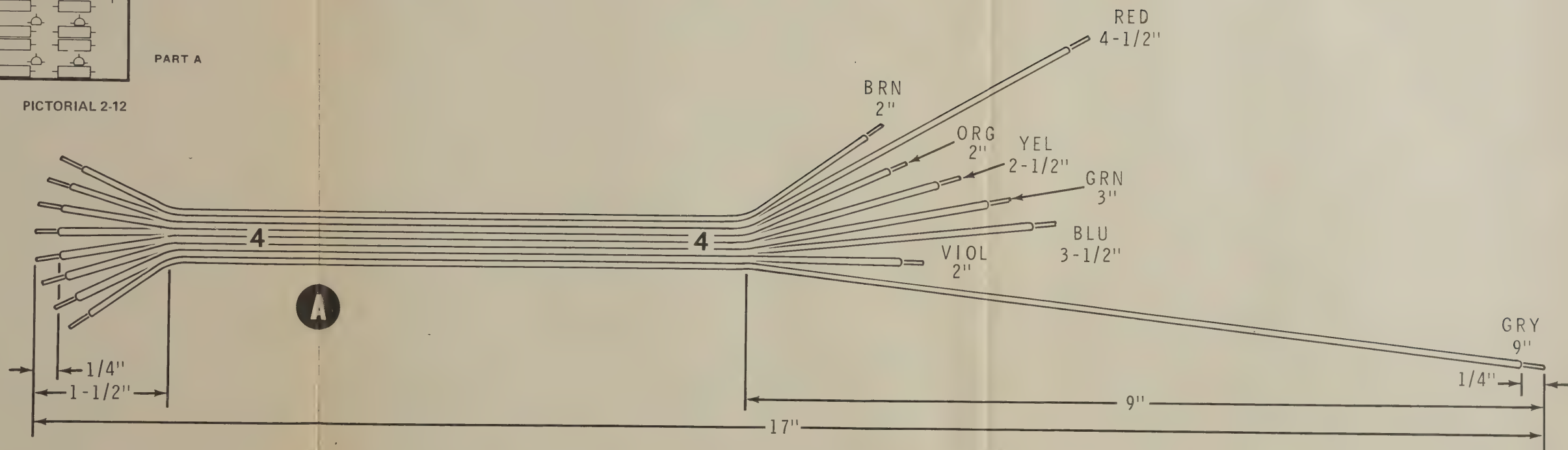
PICTORIAL 2-12

Refer to Pictorial 2-11 and connect the wires of cable #10 end A as follows:

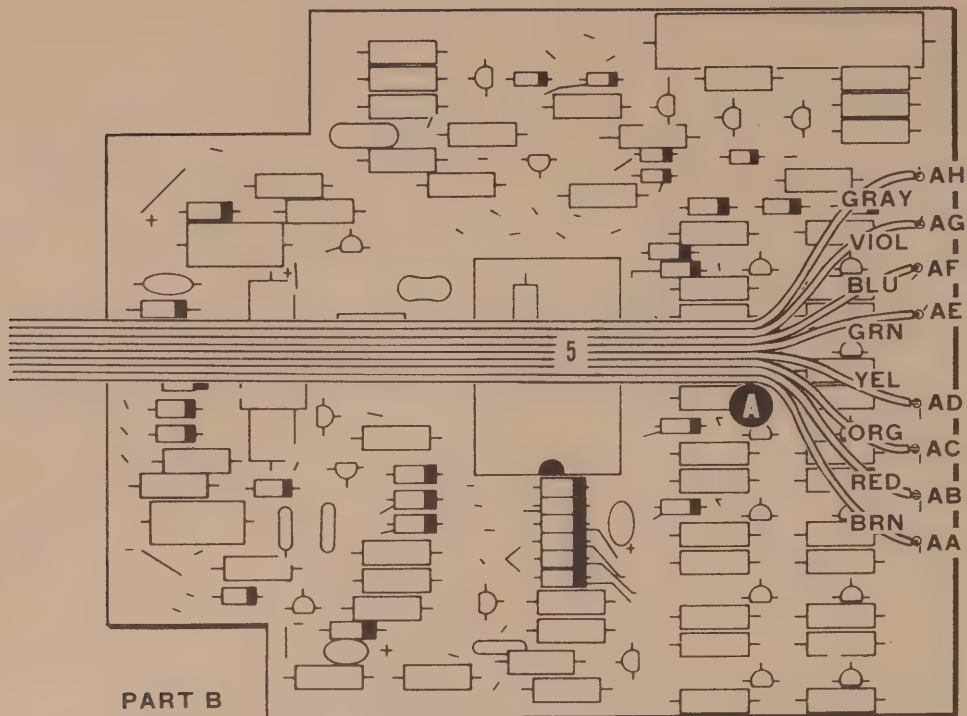
- () Red to hole EB (S-1).
- () Orange to hole EF (S-1).
- () Brown to hole EA (S-1).
- () Cut a 17" length of 8-wire cable and prepare it as shown in Detail 2-12A (fold-out from this page). Mark this cable #4 at the two indicated locations.

Refer to Part A of Pictorial 2-12 and connect cable #4 end A as follows:

- () Brown to hole BB (S-1).
- () Red to hole BD (S-1).
- () Orange to hole BE (S-1).
- () Yellow to hole BF (S-1). NOTE: Do not connect this wire to the hole at the end of the diode outline by mistake.
- () Green to hole BG (S-1). NOTE: The letters BG are covered up by resistor R228.
- () Blue to hole BH (S-1). NOTE: The letters BH are covered up by resistor R227.
- () Violet to hole BJ (S-1).
- () Gray to hole BK (S-1).



Detail 2-12A



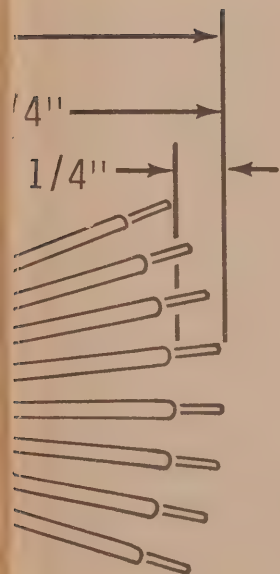
PICTORIAL 2-12

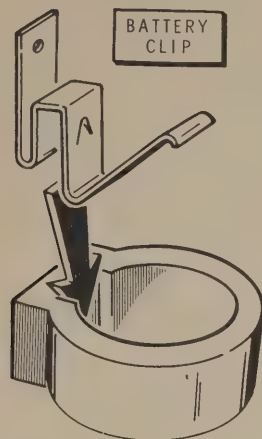
- () Cut a 14" length of 8-wire cable and prepare it as shown in Detail 2-12B. Mark this cable #5 at the two indicated locations.

Refer to Part B of Pictorial 2-12 and connect cable #5 end A as follows:

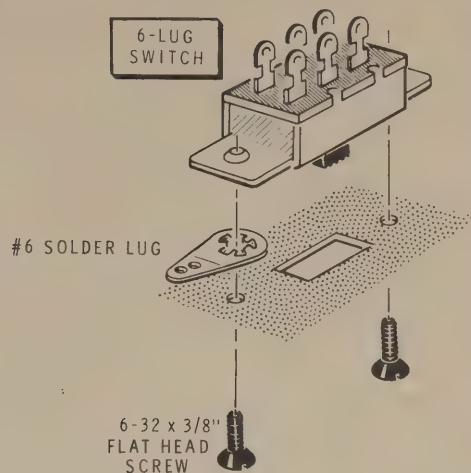
- (/) Gray to hole AH (S-1).
- (/) Violet to hole AG (S-1).
- (/) Blue to hole AF (S-1).
- (/) Green to hole AE (S-1).
- (/) Yellow to hole AD (S-1).
- (/) Orange to hole AC (S-1).
- (/) Red to hole AB (S-1).
- (/) Brown to hole AA (S-1).

This completes the wiring to the main circuit board.





Detail 3-1A



Detail 3-1B

CASE BOTTOM ASSEMBLY

Refer to Pictorial 3-1 (fold-out from Page 32) for the following steps.

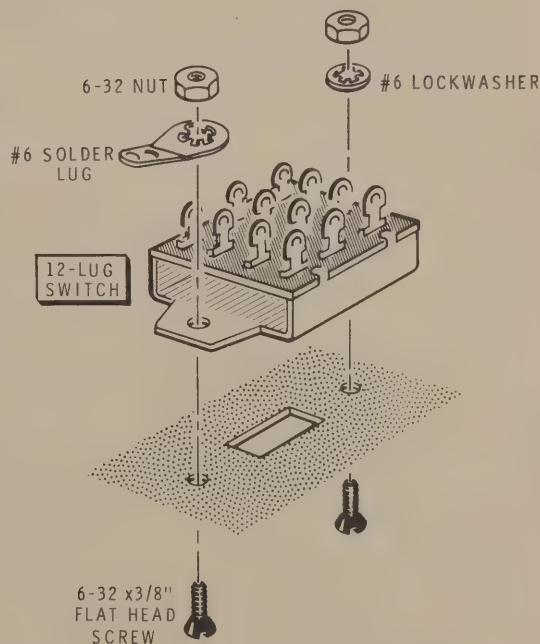
- () Place a soft cloth on your work bench to protect the painted surface of the case back while you perform the following steps.
- (✓) Refer to Detail 3-1A and install battery contacts (#260-83) in the case bottom at B301, B302, and B303. Position the contacts as shown in the Pictorial; then press the contacts into the battery mounting holes.

NOTES:

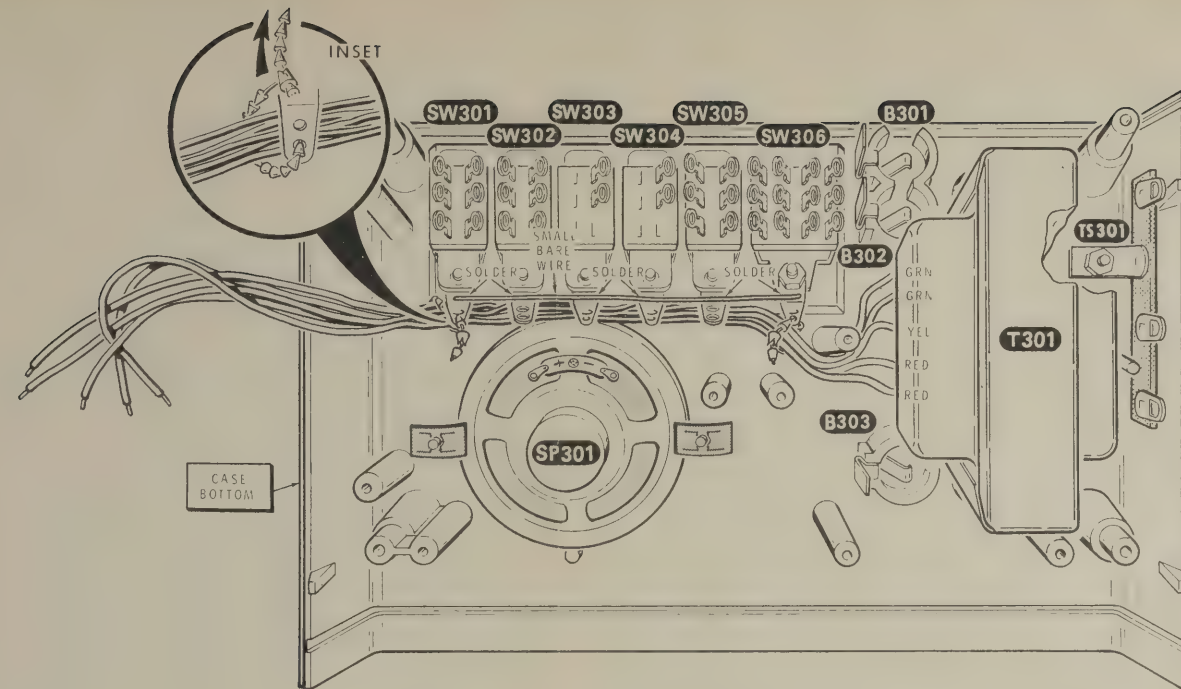
1. When hardware is called for in a step, only the screw size will be given. The Detail referred to in the step will show if any lockwashers, solder lugs, or nuts will be used.
2. Each of the five following switches will be mounted using two 6-32 x 3/8 inch flat head screws and one #6 solder lug as shown in Detail 3-1B. Position each switch and solder lug as shown in the Pictorial.

- () SW301: 6-lug switch (DPDT #60-49).
- () SW302: 6-lug switch (DPDT #60-49).
- () SW303: 2-lug switch (SPST #60-6).

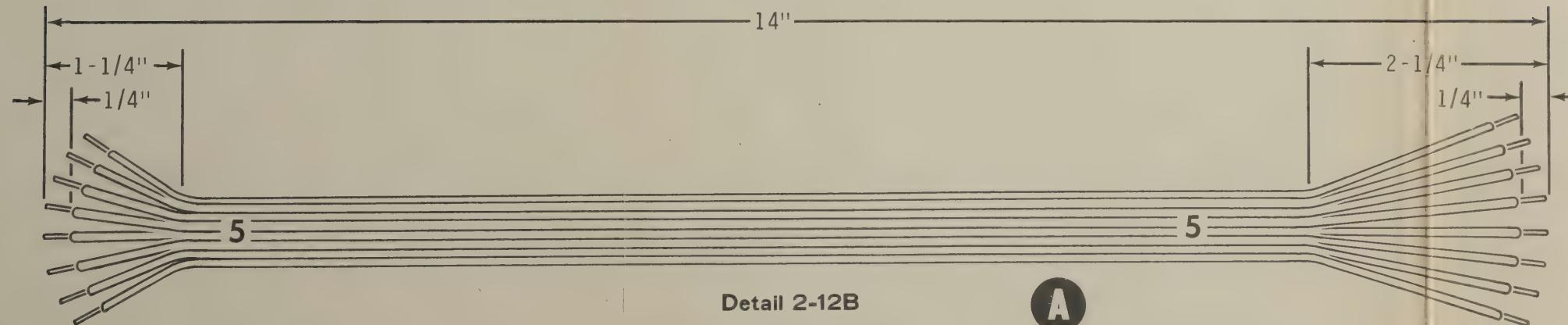
- () SW304: 2-lug switch (SPST #60-6).
- () SW305: 6-lug switch (DPDT #60-49).
- () SW306: 12-lug switch (4 PDT #60-29). Refer to Detail 3-1C and use two 6-32 x 3/8 inch screws, a #6 solder lug, a #6 lockwasher, and two 6-32 nuts as shown.



Detail 3-1C

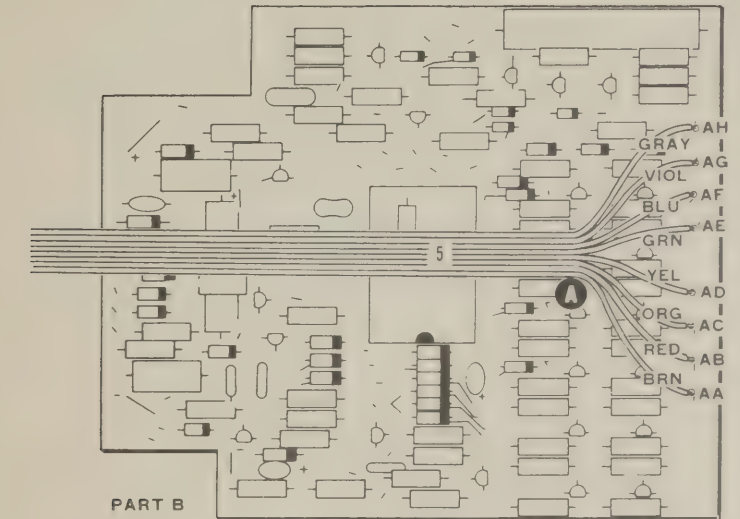


PICTORIAL 3-1



Detail 2-12B

A



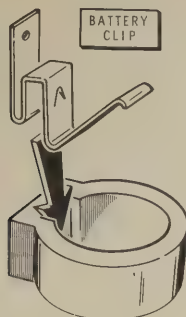
PICTORIAL 2-12

() Cut a 14" length of 8-wire cable and prepare it as shown in Detail 2-12B. Mark this cable #5 at the two indicated locations.

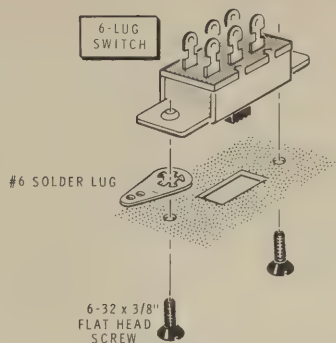
Refer to Part B of Pictorial 2-12 and connect cable #5 end A as follows:

- (/) Gray to hole AH (S-1).
- (/) Violet to hole AG (S-1).
- () Blue to hole AF (S-1).
- () Green to hole AE (S-1).
- (') Yellow to hole AD (S-1).
- (/) Orange to hole AC (S-1).
- (') Red to hole AB (S-1).
- (/) Brown to hole AA (S-1).

This completes the wiring to the main circuit board.



Detail 3-1A



Detail 3-1B

CASE BOTTOM ASSEMBLY

Refer to Pictorial 3-1 (fold-out from Page 32) for the following steps.

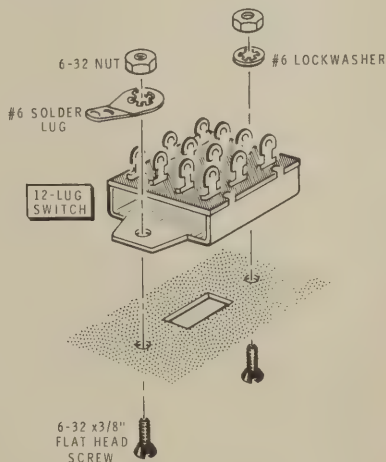
- () Place a soft cloth on your work bench to protect the painted surface of the case back while you perform the following steps.
- () Refer to Detail 3-1A and install battery contacts (#260-83) in the case bottom at B301, B302, and B303. Position the contacts as shown in the Pictorial; then press the contacts into the battery mounting holes.

NOTES:

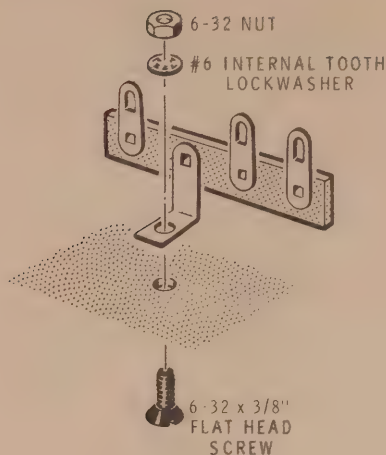
1. When hardware is called for in a step, only the screw size will be given. The Detail referred to in the step will show if any lockwashers, solder lugs, or nuts will be used.
2. Each of the five following switches will be mounted using two 6-32 x 3/8" flat head screws and one #6 solder lug as shown in Detail 3-1B. Position each switch and solder lug as shown in the Pictorial.

- () SW301: 6-lug switch (DPDT #60-49).
- () SW302: 6-lug switch (DPDT #60-49).
- () SW303: 2-lug switch (SPST #60-6).

- () SW304: 2-lug switch (SPST #60-6).
- () SW305: 6-lug switch (DPDT #60-49).
- () SW306: 12-lug switch (4 PDT #60-29). Refer to Detail 3-1C and use two 6-32 x 3/8" screws, a #6 solder lug, a #6 lockwasher, and two 6-32 nuts as shown.



Detail 3-1C



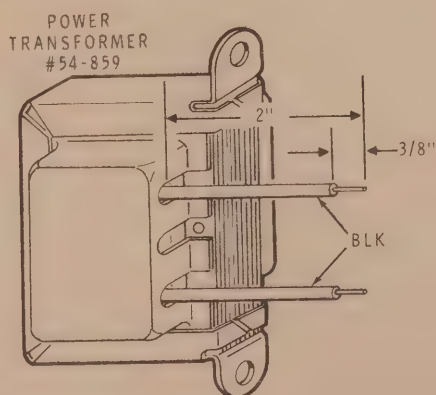
Detail 3-1D

- (✓) Cut a 3-1/2" length of small bare wire. Then connect together the six solder lugs (lug 7) of each of the six switches. Solder the wire to the flat portion of each solder lug as shown in the Pictorial.

- (✓) TS301: Refer to Detail 3-1D and mount a 3-lug terminal strip with 6-32 x 3/8" hardware as shown in the Pictorial.

NOTE: Of the following two steps, only perform the one that pertains to your kit. Cut the leads to the proper length and remove 3/8" of insulation from each shortened lead.

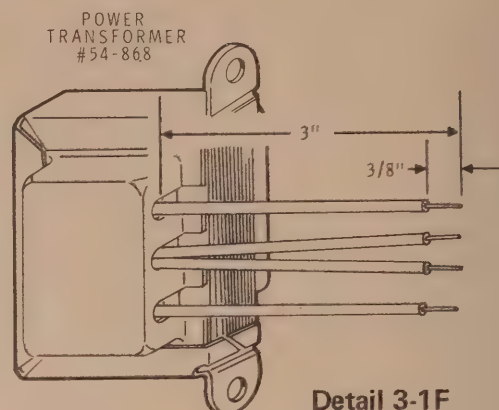
FOR MODEL GC-1092A



Detail 3-1E

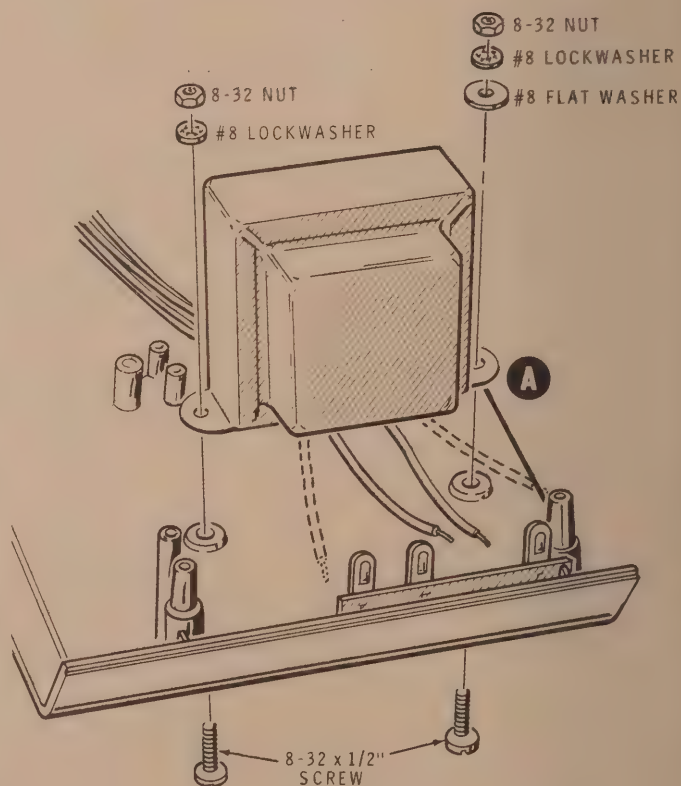
- (✓) Refer to Detail 3-1E and prepare the black leads of transformer #54-859 as shown. DO NOT cut the yellow, green, and red leads.

FOR MODEL GC-1092AE



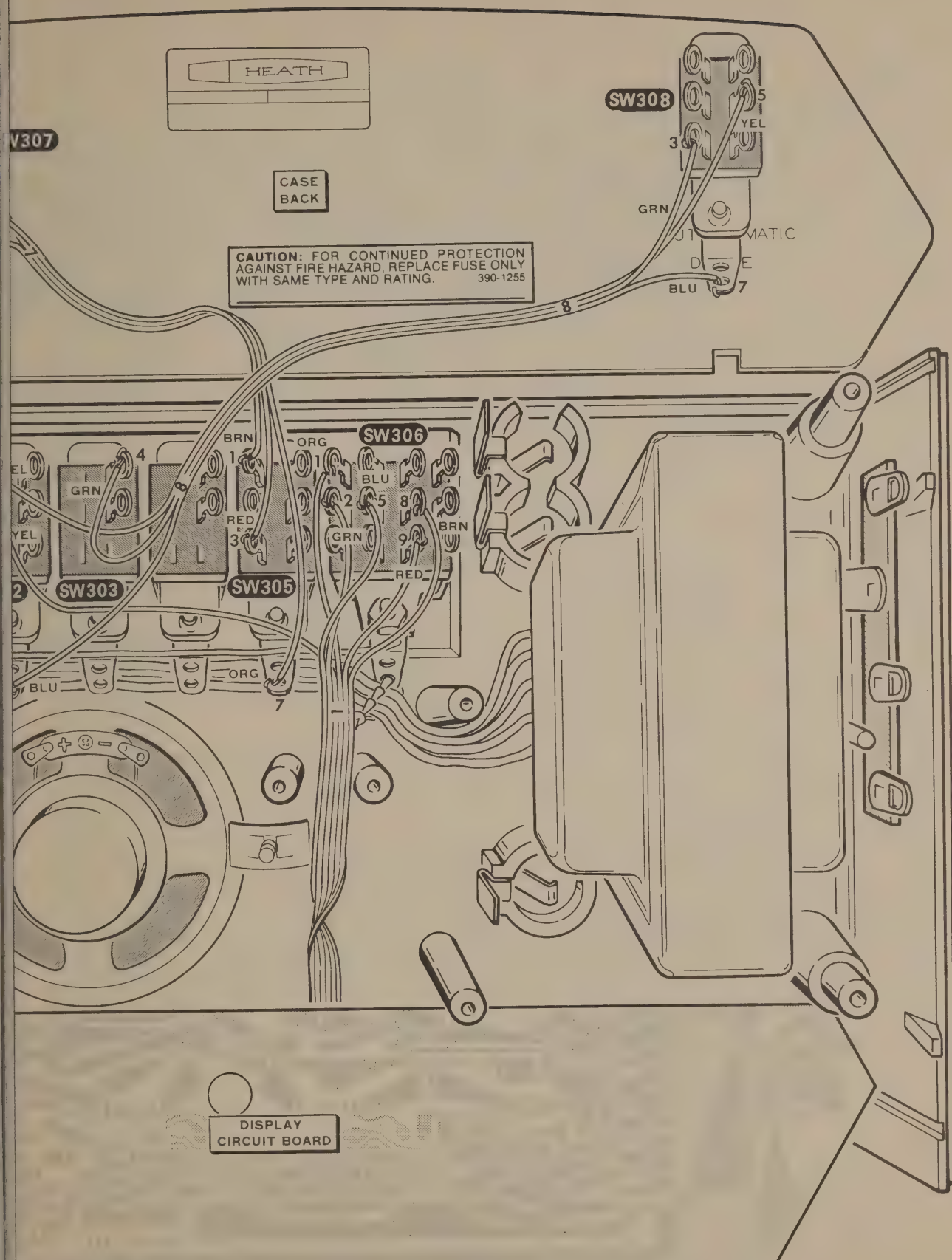
Detail 3-1F

- () Refer to Detail 3-1F and prepare the black, black-yellow, black-green, and black-red leads of transformer #54-868 as shown. DO NOT cut the yellow, green, and red leads.

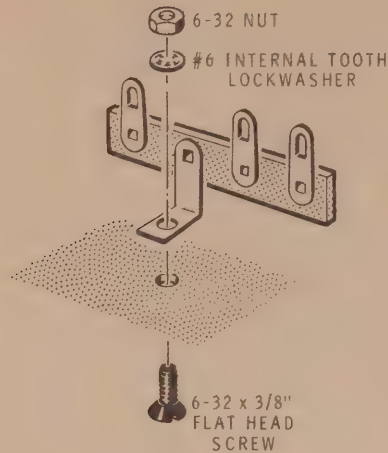


Detail 3-1G

- (✓) T301: Refer to Detail 3-1G and mount the prepared transformer with 8-32 x 1/2" hardware. Tighten the nut at A only finger tight.



PICTORIAL 3-4



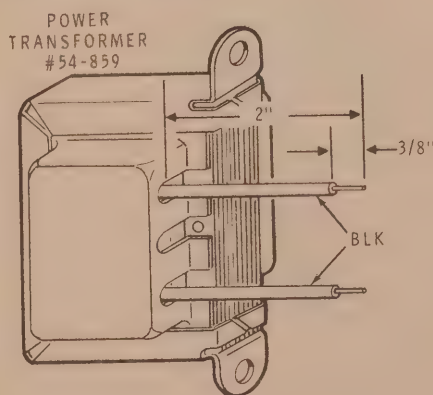
Detail 3-1D

() Cut a 3-1/2" length of small bare wire. Then connect together the six solder lugs (lug 7) of each of the six switches. Solder the wire to the flat portion of each solder lug as shown in the Pictorial.

(✓) TS301: Refer to Detail 3-1D and mount a 3-lug terminal strip with 6-32 x 3/8" hardware as shown in the Pictorial.

NOTE: Of the following two steps, only perform the one that pertains to your kit. Cut the leads to the proper length and remove 3/8" of insulation from each shortened lead.

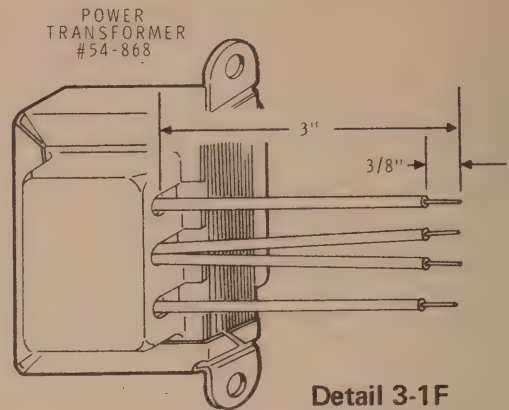
FOR MODEL GC-1092A



Detail 3-1E

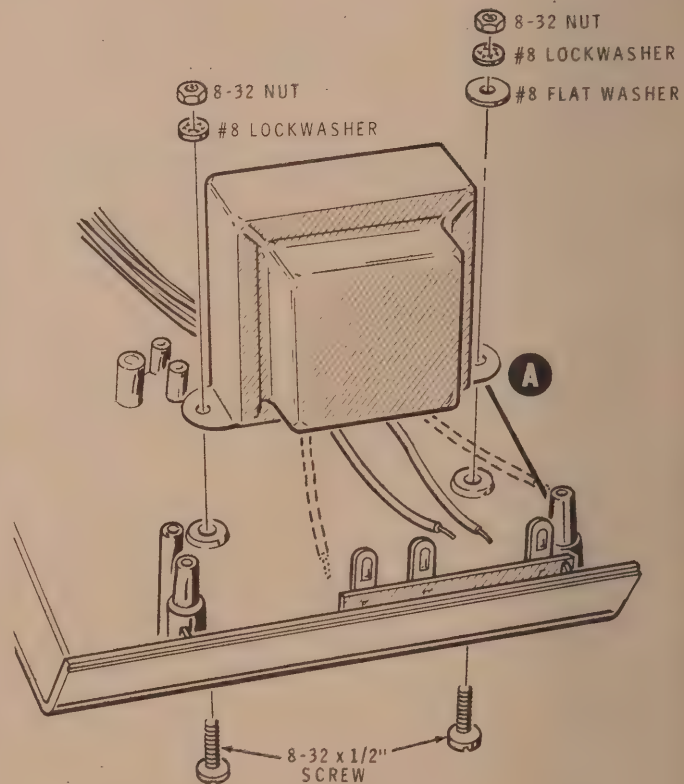
(✓) Refer to Detail 3-1E and prepare the black leads of transformer #54-859 as shown. DO NOT cut the yellow, green, and red leads.

FOR MODEL GC-1092AE



Detail 3-1F

() Refer to Detail 3-1F and prepare the black, black-yellow, black-green, and black-red leads of transformer #54-868 as shown. DO NOT cut the yellow, green, and red leads.



Detail 3-1G

(✓) T301: Refer to Detail 3-1G and mount the prepared transformer with 8-32 x 1/2" hardware. Tighten the nut at A only finger tight.

PRELIMINARY WIRING

- () Cut a 5" length of 8-wire cable and separate the cable into eight individual wires.

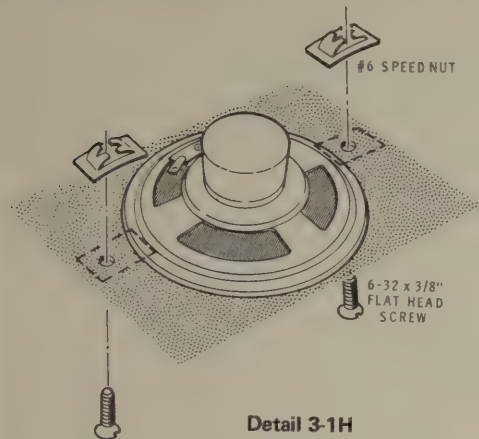
NOTES:

1. Use the color and length of wire called for in each step. Remove 1/4" of insulation from each end of each wire. Twist the fine strands and apply a small amount of solder to the wire ends to hold the strands together.
2. AFTER A WIRE HAS BEEN CONNECTED, POSITION IT DOWN AROUND AND/OR BETWEEN THE SWITCHES AND OUT OF THE WAY.

Refer to Pictorial 3-2 (fold-out from this page) for the following steps. Use the previously separated eight wires.

- (✓) 2" brown wire from SW301 lug 1 (S-1) to SW302 lug 1 (NS).
- (✓) 3" red wire from SW301 lug 2 (S-1) to SW302 lug 2 (NS).
- (✓) 3" yellow wire from SW301 lug 5 (S-1) to SW302 lug 6 (S-1).
- (✓) 2-1/2" orange wire from SW301 lug 4 (S-1) to SW303 lug 4 (NS).
- (✓) 2-1/2" green wire from SW302 lug 4 (S-1) to SW304 lug 4 (NS).
- (✓) 3" blue wire from SW303 lug 4 (NS) to SW305 lug 5 (NS).
- (✓) 1-1/2" violet wire from SW304 lug 4 (S-2) to SW305 lug 2 (NS).
- (✓) 1-1/2" red wire from battery clip B301 (S-1) to battery clip B302 (S-1).
- (✓) 3" brown wire from SW306 lug 11 (S-1) to battery clip B303 (S-1).

Temporarily place the case bottom to one side.



Detail 3-1H

- () SP301: Refer to Detail 3-1H and mount the speaker with 6-32 x 3/8" hardware. Position the speaker lugs as shown in the Pictorial. CAUTION: Tighten the screws only enough to hold the speaker in place.

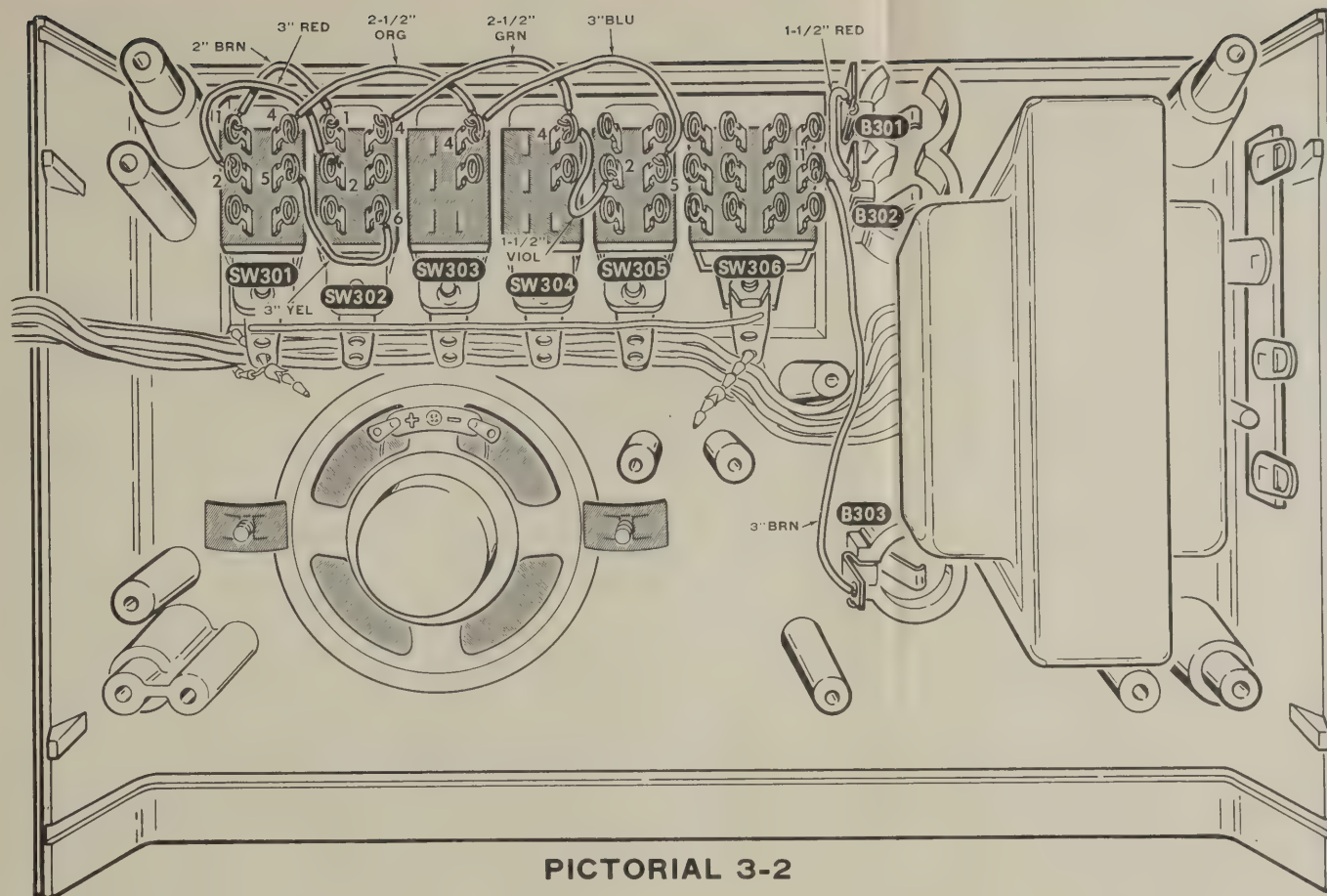
- () Refer to Detail 3-1K and prepare two 2" x 1/2" pieces of fish paper as shown.

- () Remove the protective backing from the pieces of fish paper, one at a time, and press the fish paper onto the transformer as shown in Detail 3-1L.

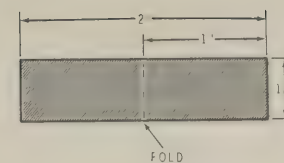
- () Group the yellow, green, and red transformer leads together and position them as shown in the Pictorial.

- () *Refer to the inset drawing on Pictorial 3-1 and insert the straight end of a cable tie down through a hole in the solder lug of switch SW306. Pass the cable tie under the red, green, and yellow leads of transformer T301; then back up through the hole in the other end of the cable tie. Pull the loop in the cable tie snug and cut off the excess length.

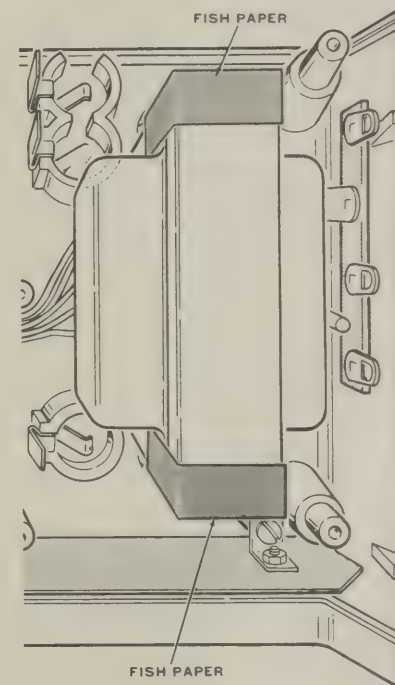
- () In a like manner, install a cable tie through the solder lug at SW301 and secure the transformer leads to the solder lug.



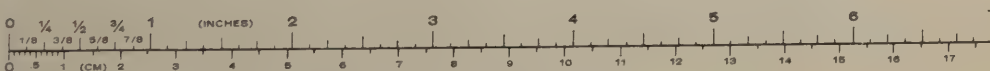
PICTORIAL 3-2

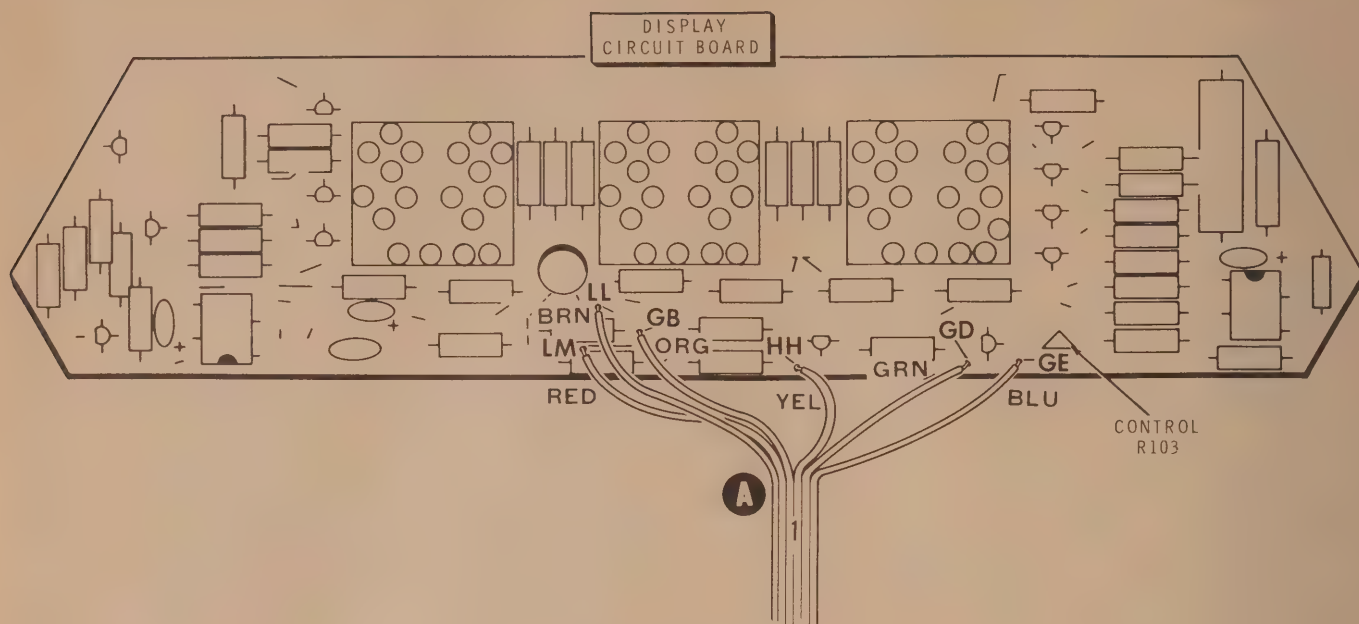


Detail 3-1K



Detail 3-1L





PICTORIAL 3-3

Refer to Pictorial 3-3 for the following steps.

Locate cable #1 and connect the wires at end A (the shorter prepared end) to the display circuit board as follows. Solder the wires to the circuit board foils and cut off the excess lead lengths.

- (✓) Brown to hole LL (S-1).
- (✓) Red to hole LM (S-1).
- (✓) Orange to hole GB (S-1).
- (✓) Yellow to hole HH (S-1).
- (✓) Green to hole GD (S-1).
- () Blue to hole GE (S-1). NOTE: Hole GE is under control R103.

Refer to Pictorial 3-4 (fold-out from this page) for the following steps.

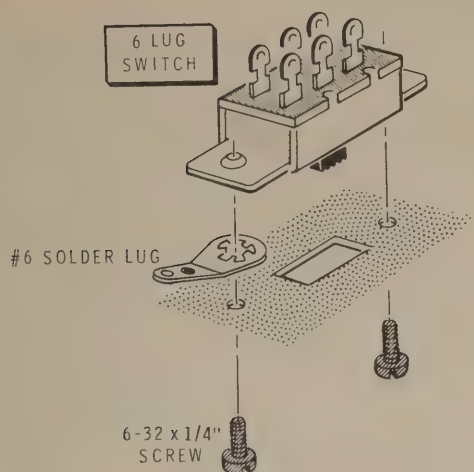
Connect the wires at the free end of cable #1 coming from the display circuit board to the case bottom as follows:

- (✓) Brown to SW306 lug 8 (S-1).

- (✓) Red to SW306 lug 9 (S-1).
- (✓) Orange to SW306 lug 1 (S-1).
- (✓) Yellow to SW302 lug 2 (S-2).
- (✓) Green to SW306 lug 2 (NS).
- () Blue to SW306 lug 5 (S-1).

The case back (#95-75) is marked on both sides so it can be used with another Clock. When you mount the labels and switches in the following steps, be sure you mount them so they are ON THE SIDE MARKED AUTOMATIC DATE.

- () Carefully peel the backing paper from the blue and white identification label. Then press the label onto the inside of the case back as shown. Be sure you refer to the numbers on this label in any communications you have with the Heath Company about this kit.
- () Carefully peel the backing paper from the fuse label. Then press the label onto the inside of the case back as shown. Mark the fuse type and rating on the label as shown in the Pictorial.



Detail 3-4A

NOTE: Two switches and two solder lugs will be mounted on the inside of the case back with 6-32 x 1/4" hardware as shown in Detail 3-4A. Position the case back and the solder lugs as shown in the Pictorial.

(✓) SW307: DPDT switch. See Detail 3-4A.

(✓) SW308: DPDT switch. See Detail 3-4A.

(✓) Cut an 8" length of 8-wire cable and, as a pair, remove and save the violet and gray wires. Then split apart the orange and yellow wires to form two 3-wire cables.

() Refer to Detail 3-4B (fold-out from this page) and prepare the blue, green, and yellow 3-wire cable as shown. Mark this cable #8 at the two locations shown.

Connect the blue, green, and yellow wires at one end of cable #8, to switch SW308 on the case back as follows:

(✓) Blue to SW308 lug 7 (S-1).

(✓) Yellow to SW308 lug 5 (S-1).

() Green to SW308 lug 3 (S-1).

Connect the wires at the free end of cable #8 as follows:

(✓) Green to SW303 lug 4 (S-3).

(✓) Blue to SW302 lug 7 (S-1). CAUTION: Do not burn the transformer leads.

(✓) Yellow to SW302 lug 1 (S-2).

() Refer to Detail 3-4C and prepare the previously cut orange, red, and brown 3-wire cable as shown. Mark this cable #7 at the two indicated locations.

Connect the orange, red, and brown wires at either end of cable #7 to switch SW307 on the case back as follows:

(✓) Orange to SW307 to lug 7 (S-1).

(✓) Red to SW307 lug 5 (S-1).

(✓) Brown to SW307 lug 3 (NS).

NOTE: In the next step, be sure you position the banded end of the diode as shown in the Pictorial.

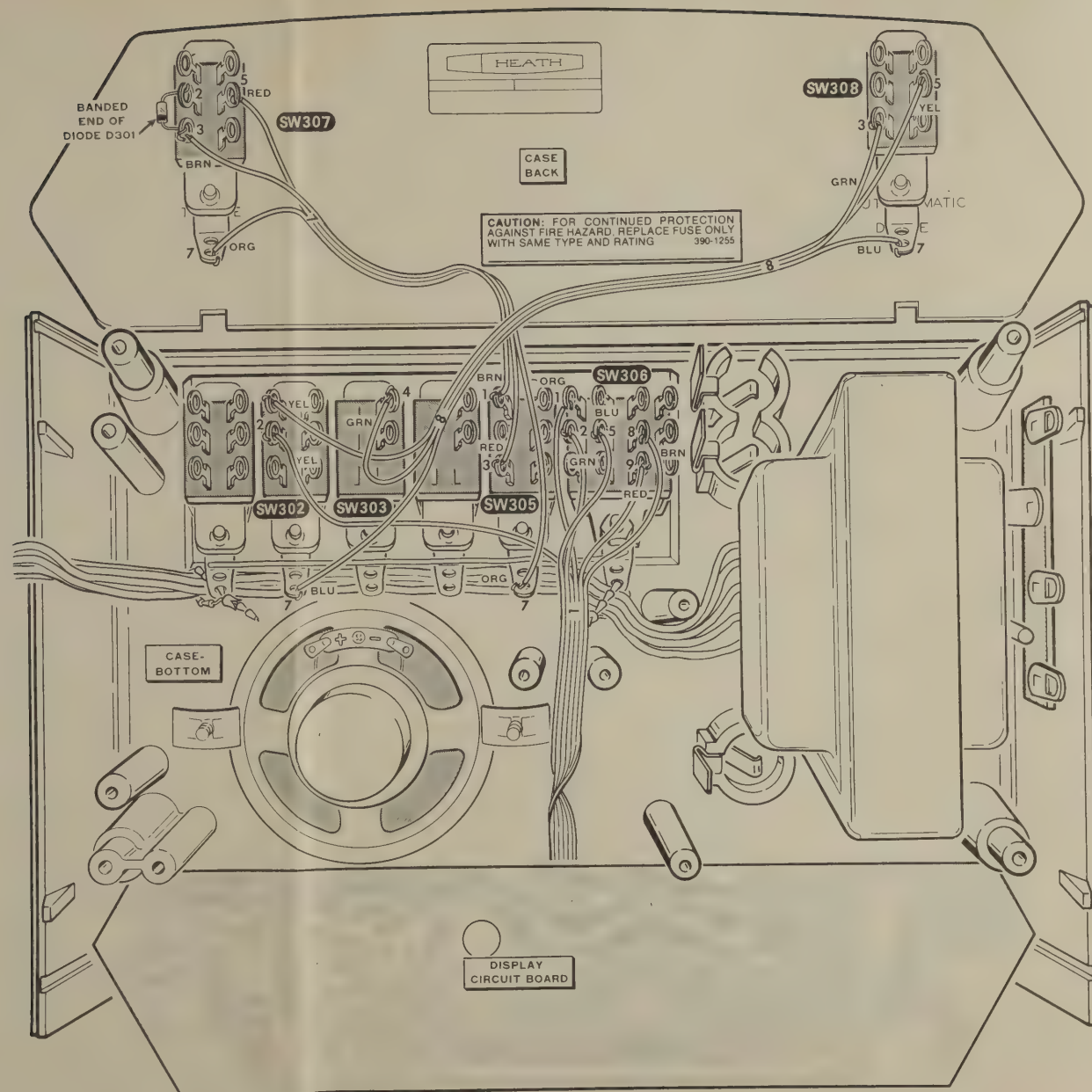
(✓) D301: Diode #56-56 between switch SW307 lugs 2 (S-1) and 3 (S-2).

Connect the wires at the free end of cable #7 as follows:

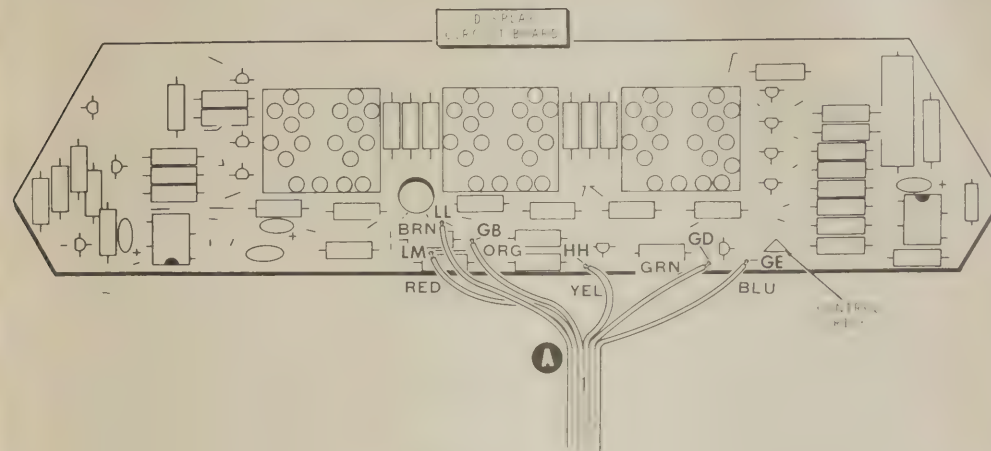
(✓) Brown to SW305 lug 1 (S-1).

(✓) Red to SW305 lug 3 (S-1).

(✓) Orange to SW305 lug 7 (S-1). CAUTION: Do not burn the transformer leads.



PICTORIAL 3-4



PICTORIAL 3-3

Refer to Pictorial 3-3 for the following steps.

Locate cable #1 and connect the wires at end A (the shorter prepared end) to the display circuit board as follows. Solder the wires to the circuit board foils and cut off the excess lead lengths.

(✓) Brown to hole LL (S-1).

(✓) Red to hole LM (S-1).

(✓) Orange to hole GB (S-1).

(✓) Yellow to hole HH (S-1).

(✓) Green to hole GD (S-1).

() Blue to hole GE (S-1). NOTE: Hole GE is under control R103.

Refer to Pictorial 3-4 (fold-out from this page) for the following steps.

Connect the wires at the free end of cable #1 coming from the display circuit board to the case bottom as follows:

(✓) Brown to SW306 lug 8 (S-1).

(✓) Red to SW306 lug 9 (S-1).

(✓) Orange to SW306 lug 1 (S-1).

(✓) Yellow to SW302 lug 2 (S-2).

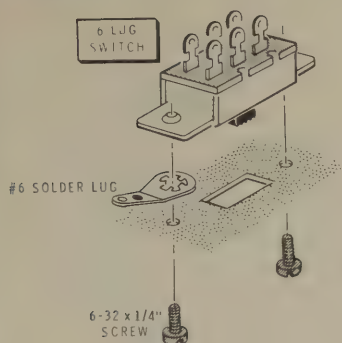
(✓) Green to SW306 lug 2 (NS).

() Blue to SW306 lug 5 (S-1).

The case back (#95-75) is marked on both sides so it can be used with another Clock. When you mount the labels and switches in the following steps, be sure you mount them so they are ON THE SIDE MARKED AUTOMATIC DATE.

() Carefully peel the backing paper from the blue and white identification label. Then press the label onto the inside of the case back as shown. Be sure you refer to the numbers on this label in any communications you have with the Heath Company about this kit.

() Carefully peel the backing paper from the fuse label. Then press the label onto the inside of the case back as shown. Mark the fuse type and rating on the label as shown in the Pictorial.



Detail 3-4A

NOTE: Two switches and two solder lugs will be mounted on the inside of the case back with 6-32 x 1/4" hardware as shown in Detail 3-4A. Position the case back and the solder lugs as shown in the Pictorial.

(✓) SW307: DPDT switch. See Detail 3-4A.

(✓) SW308: DPDT switch. See Detail 3-4A.

(✓) Cut an 8" length of 8-wire cable and, as a pair, remove and save the violet and gray wires. Then split apart the orange and yellow wires to form two 3-wire cables.

() Refer to Detail 3-4B (fold-out from this page) and prepare the blue, green, and yellow 3-wire cable as shown. Mark this cable #8 at the two locations shown.

Connect the blue, green, and yellow wires at one end of cable #8, to switch SW308 on the case back as follows:

(✓) Blue to SW308 lug 7 (S-1).

(✓) Yellow to SW308 lug 5 (S-1).

(✓) Green to SW308 lug 3 (S-1).

Connect the wires at the free end of cable #8 as follows:

(✓) Green to SW303 lug 4 (S-3).

(✓) Blue to SW302 lug 7 (S-1). **CAUTION:** Do not burn the transformer leads.

(✓) Yellow to SW302 lug 1 (S-2).

() Refer to Detail 3-4C and prepare the previously cut orange, red, and brown 3-wire cable as shown. Mark this cable #7 at the two indicated locations.

Connect the orange, red, and brown wires at either end of cable #7 to switch SW307 on the case back as follows:

(✓) Orange to SW307 to lug 7 (S-1).

(✓) Red to SW307 lug 5 (S-1).

(✓) Brown to SW307 lug 3 (NS).

NOTE: In the next step, be sure you position the banded end of the diode as shown in the Pictorial.

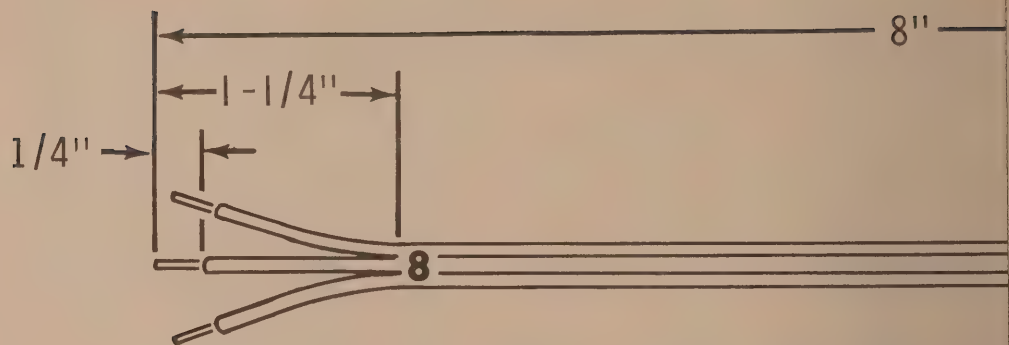
(✓) D301: Diode #56-56 between switch SW307 lugs 2 (S-1) and 3 (S-2).

Connect the wires at the free end of cable #7 as follows:

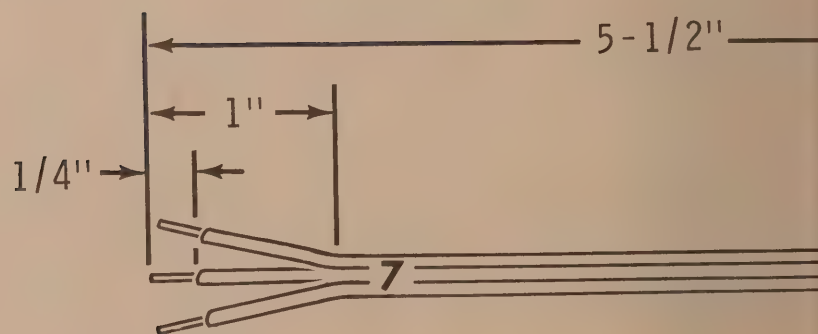
(✓) Brown to SW305 lug 1 (S-1).

(✓) Red to SW305 lug 3 (S-1).

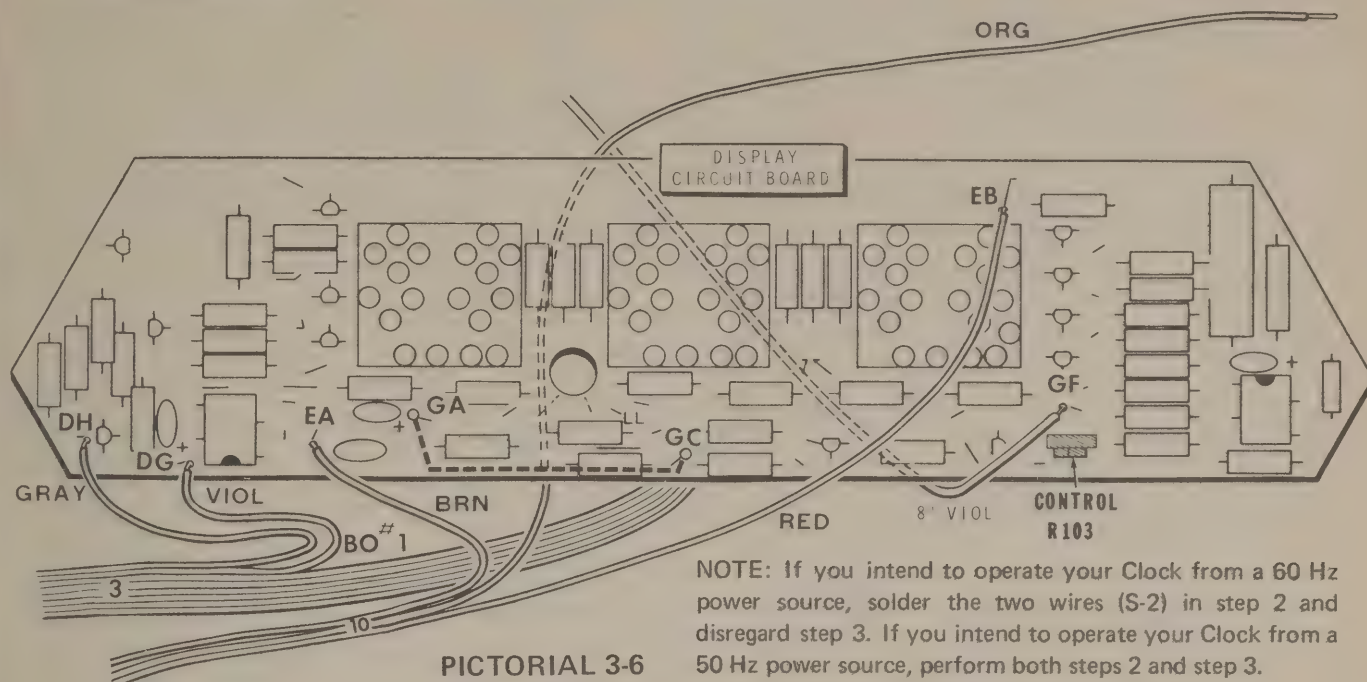
(✓) Orange to SW305 lug 7 (S-1). **CAUTION:** Do not burn the transformer leads.



Detail 3-4E



Detail 3-4C



PICTORIAL 3-6

NOTE: Perform the next three steps only if your Clock will be used as a night light. Performing these steps will defeat the automatic dimming feature and provide maximum display brightness at all times.

- () Prepare a 2-1/2" brown wire.
- () Connect this brown wire between holes GA (S-1) and GC (S-1) on the display circuit board as shown by the dashed line on Pictorial 3-6.
- () Adjust control R103 to its mid-range position. See Pictorial 3-6.

- () Locate the 17" violet and blue 2-wire cable. Then separate the two wires and discard the blue wire.

- (✓) Prepare an 8" length of the violet wire. Then connect one end of the wire in display circuit board hole GF (S-1). The other end of the wire will be connected later.

Refer to Pictorial 3-7 (fold-out from Page 43) for the following steps.

Connect the wires at the free end of cable #3 to the case bottom as follows:

- (✓) 1. Brown to SW306 lug 2 (S-2).

NOTE: If you intend to operate your Clock from a 60 Hz power source, solder the two wires (S-2) in step 2 and disregard step 3. If you intend to operate your Clock from a 50 Hz power source, perform both steps 2 and step 3.

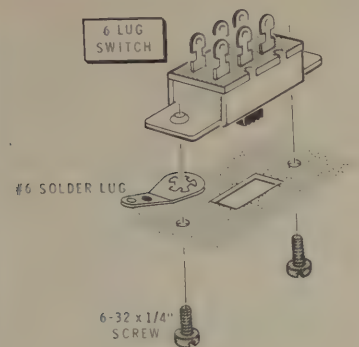
- (✓) 2. Red to SW305 lug 2.
- () 3. Connect the free end of the black wire coming from BA on the main circuit board to switch SW305 lug 2 (S-3).
- (✓) 4. Orange to SW306 lug 3 (S-1).
- (✓) 5. Yellow to SW305 lug 5 (S-2).
- (✓) 6. Green to SW306 lug 4 (S-1).
- (✓) 7. Blue to SW306 lug 6 (S-1).
- (✓) Connect the free end of the violet wire coming from the display circuit board to switch SW304 lug 7 (S-1).

Connect the wires at the free end of cable #2 as follows:

- (✓) Gray to speaker SP301 lug 1 (S-1).
- (✓) Violet to speaker SP301 lug 2 (S-1).
- (✓) Connect the free end of the gray wire to SW306 lug 12 (S-1).
- () Loosely twist together the brown, orange, and violet wires at the free end of cable #4.

Connect the wires at the free end of cable #4 as follows:

- (✓) Brown to SW307 lug 1 (NS).
- (✓) Violet to SW307 lug 1 (S-2).



Detail 3-4A

NOTE: Two switches and two solder lugs will be mounted on the inside of the case back with 6-32 x 1/4" hardware as shown in Detail 3-4A. Position the case back and the solder lugs as shown in the Pictorial.

(✓) SW307: DPDT switch. See Detail 3-4A.

(✓) SW308: DPDT switch. See Detail 3-4A.

(✓) Cut an 8" length of 8-wire cable and, as a pair, remove and save the violet and gray wires. Then split apart the orange and yellow wires to form two 3-wire cables.

() Refer to Detail 3-4B (fold-out from this page) and prepare the blue, green, and yellow 3-wire cable as shown. Mark this cable #8 at the two locations shown.

Connect the blue, green, and yellow wires at one end of cable #8, to switch SW308 on the case back as follows:

(✓) Blue to SW308 lug 7 (S-1).

(✓) Yellow to SW308 lug 5 (S-1).

(✓) Green to SW308 lug 3 (S-1).

Connect the wires at the free end of cable #8 as follows:

(✓) Green to SW303 lug 4 (S-3).

(✓) Blue to SW302 lug 7 (S-1). CAUTION: Do not burn the transformer leads.

(✓) Yellow to SW302 lug 1 (S-2).

() Refer to Detail 3-4C and prepare the previously cut orange, red, and brown 3-wire cable as shown. Mark this cable #7 at the two indicated locations.

Connect the orange, red, and brown wires at either end of cable #7 to switch SW307 on the case back as follows:

(✓) Orange to SW307 to lug 7 (S-1).

(✓) Red to SW307 lug 5 (S-1).

(✓) Brown to SW307 lug 3 (NS).

NOTE: In the next step, be sure you position the banded end of the diode as shown in the Pictorial.

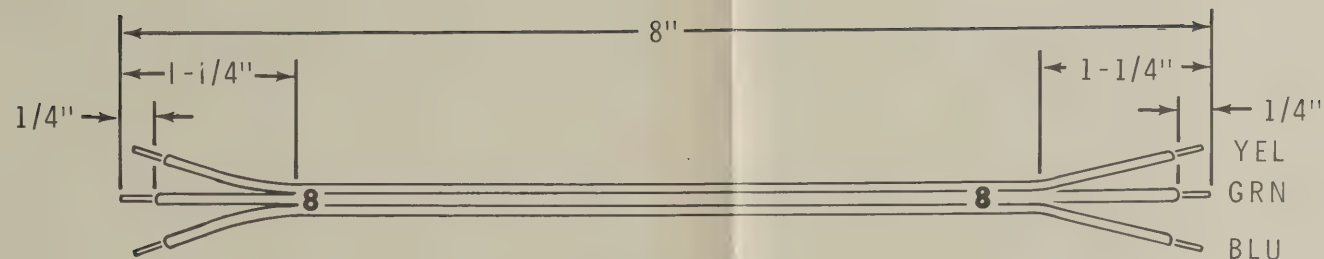
(✓) D301: Diode #56-56 between switch SW307 lugs 2 (S-1) and 3 (S-2).

Connect the wires at the free end of cable #7 as follows:

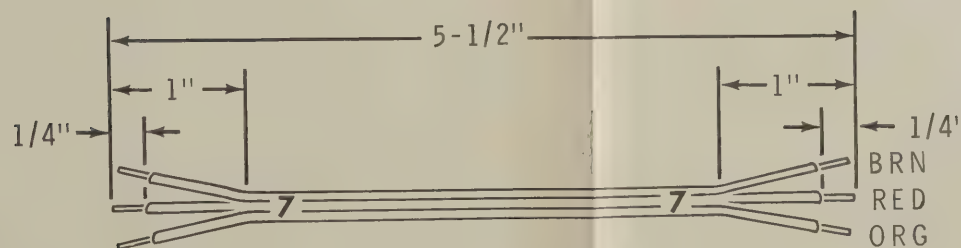
(✓) Brown to SW305 lug 1 (S-1).

(✓) Red to SW305 lug 3 (S-1).

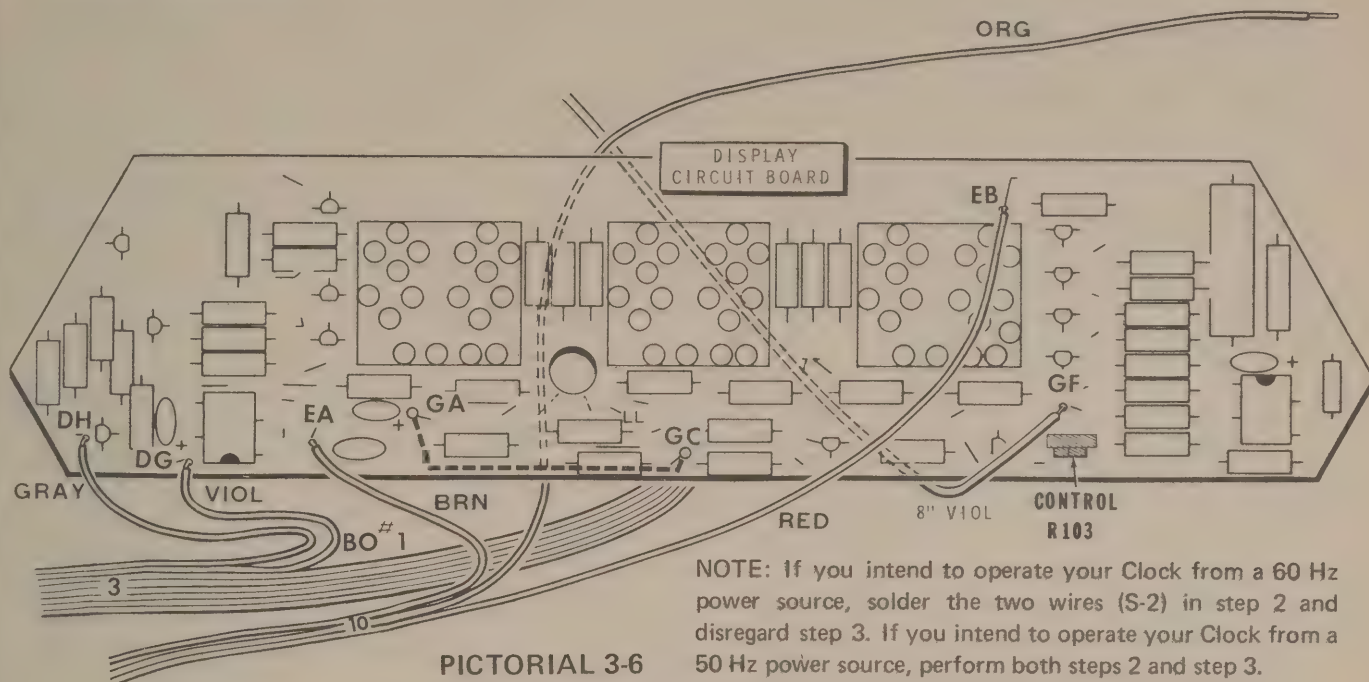
(✓) Orange to SW305 lug 7 (S-1). CAUTION: Do not burn the transformer leads.



Detail 3-4B



Detail 3-4C



PICTORIAL 3-6

NOTE: Perform the next three steps only if your Clock will be used as a night light. Performing these steps will defeat the automatic dimming feature and provide maximum display brightness at all times.

- () Prepare a 2-1/2" brown wire.
- () Connect this brown wire between holes GA (S-1) and GC (S-1) on the display circuit board as shown by the dashed line on Pictorial 3-6.
- () Adjust control R103 to its mid-range position. See Pictorial 3-6.

- () Locate the 17" violet and blue 2-wire cable. Then separate the two wires and discard the blue wire.

- (✓) Prepare an 8" length of the violet wire. Then connect one end of the wire in display circuit board hole GF (S-1). The other end of the wire will be connected later.

Refer to Pictorial 3-7 (fold-out from Page 43) for the following steps.

Connect the wires at the free end of cable #3 to the case bottom as follows:

- (✓) 1. Brown to SW306 lug 2 (S-2).

NOTE: If you intend to operate your Clock from a 60 Hz power source, solder the two wires (S-2) in step 2 and disregard step 3. If you intend to operate your Clock from a 50 Hz power source, perform both steps 2 and step 3.

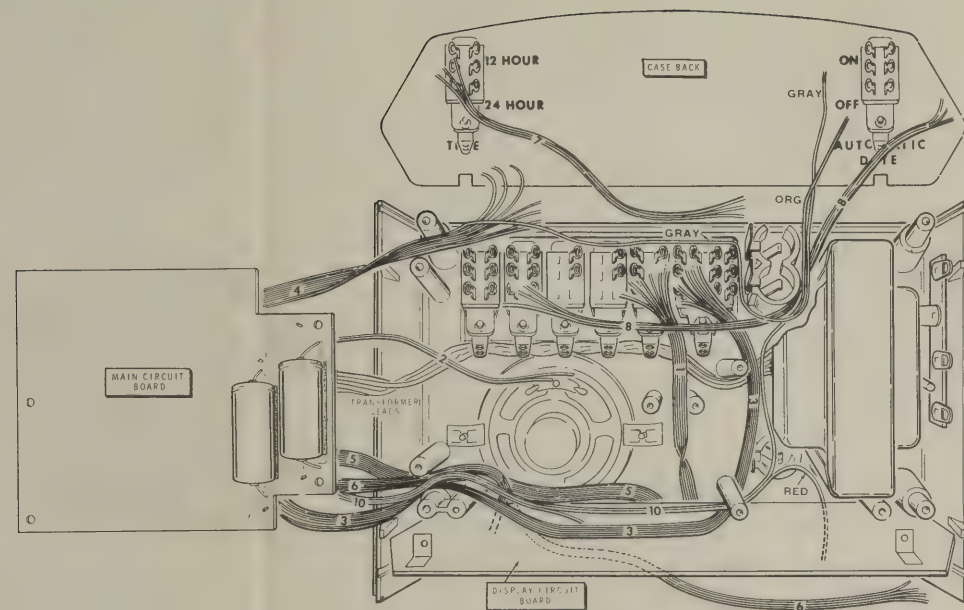
- (✓) 2. Red to SW305 lug 2.
- () 3. Connect the free end of the black wire coming from BA on the main circuit board to switch SW305 lug 2 (S-3).
- (✓) 4. Orange to SW306 lug 3 (S-1).
- (✓) 5. Yellow to SW305 lug 5 (S-2).
- (✓) 6. Green to SW306 lug 4 (S-1).
- (✓) 7. Blue to SW306 lug 6 (S-1).
- (✓) Connect the free end of the violet wire coming from the display circuit board to switch SW304 lug 7 (S-1).

Connect the wires at the free end of cable #2 as follows:

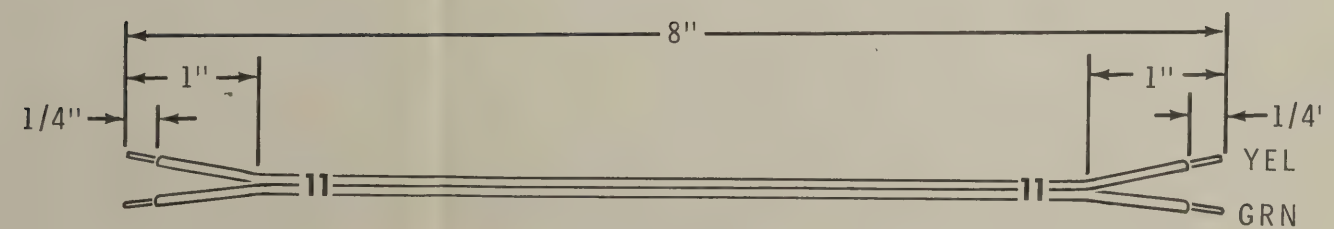
- (✓) Gray to speaker SP301 lug 1 (S-1).
- (✓) Violet to speaker SP301 lug 2 (S-1).
- (✓) Connect the free end of the gray wire to SW306 lug 12 (S-1).
- () Loosely twist together the brown, orange, and violet wires at the free end of cable #4.

Connect the wires at the free end of cable #4 as follows:

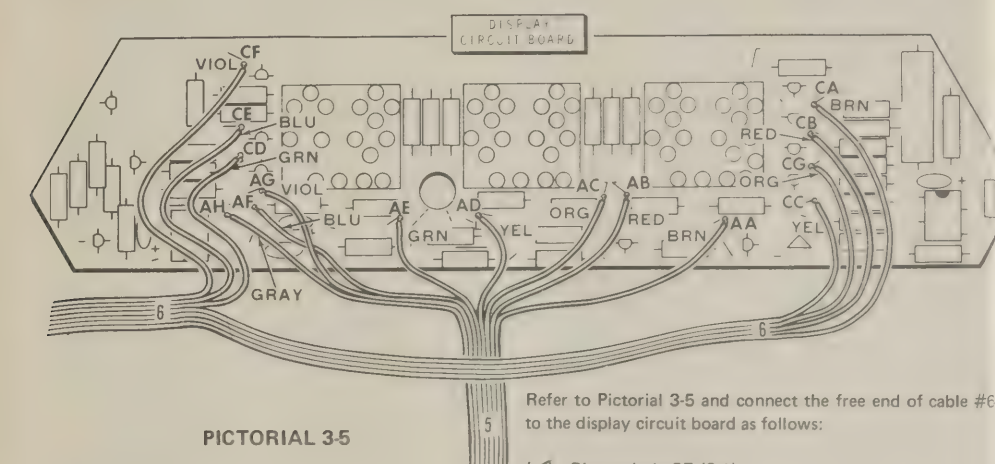
- (✓) Brown to SW307 lug 1 (NS).
- (✓) Violet to SW307 lug 1 (S-2).



Detail 3-5A



Detail 4-2D



PICTORIAL 3-5

Refer to Pictorial 3-5 and connect the free end of cable #6 to the display circuit board as follows:

OTHER WIRING

NOTE: Refer to Detail 3-5A before you connect each of the following cables. Form each cable before connecting it so it will be as close as possible to the position shown in the Detail. This will help prevent bunching and twisting, and allow the cables to lie flat when you secure the main circuit board to the case bottom.

The free ends of the cables attached to the main circuit board will be connected to the display circuit board, to the case bottom, and to the case back. Solder each wire as it is connected and cut off the excess lead lengths.

Refer to Pictorial 3-5 and connect the wires at the free end of cable #5 to the display circuit board as follows:

- (✓) Gray to hole AH (S-1).
- (✓) Blue to hole AF (S-1).
- (✓) Violet to hole AG (S-1).
- (✓) Green to hole AE (S-1).
- (✓) Yellow to hole AD (S-1).
- (✓) Orange to hole AC (S-1).
- (✓) Red to hole AB (S-1).
- (✓) Brown to hole AA (S-1).

- (✓) Blue to hole CE (S-1).
- (✓) Green to hole CD (S-1).
- (✓) Violet to hole CF (S-1).
- (✓) Yellow to hole CC (S-1).
- (✓) Orange to hole CG (S-1).
- (✓) Red to hole CB (S-1).
- (✓) Brown to hole CA (S-1).

Refer to Pictorial 3-6 and connect the wires from breakout #1 (BO#1) of cable #3 to the display circuit board as follows:

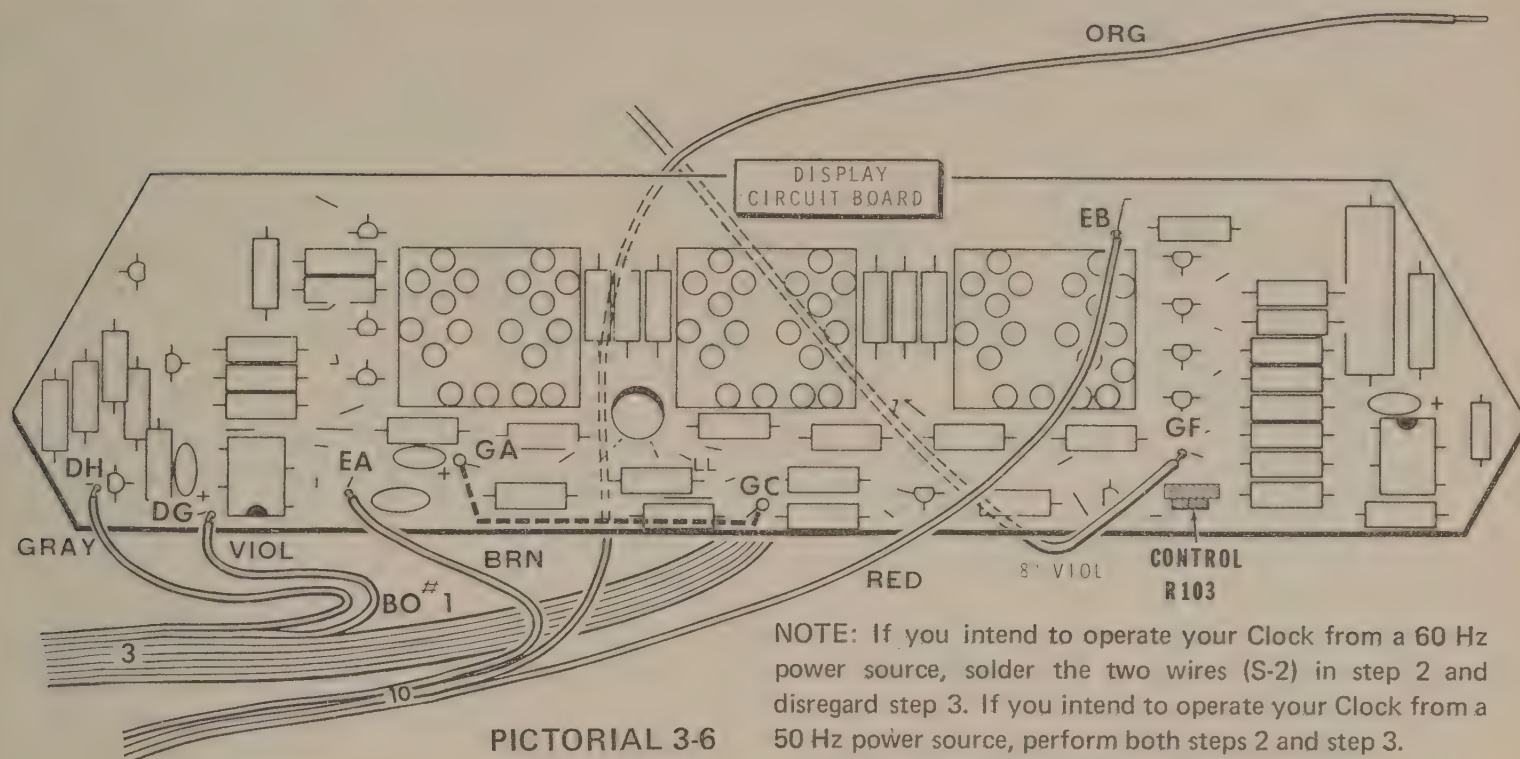
- (✓) Gray to hole DH (S-1).
- (✓) Violet to hole DG (S-1).

The free end of cable #3 will be connected later.

Refer to Pictorial 3-6 and connect the brown and red wires of cable #10 to the display circuit board as follows:

- (✓) Brown to hole EA (S-1).
- (✓) Red to hole EB (S-1).

(✓) Refer to Pictorial 3-7 (fold-out from Page 43) and connect the orange wire of cable #10 to switch SW308 lug 4 (S-1) on the case back.



PICTORIAL 3-6

NOTE: If you intend to operate your Clock from a 60 Hz power source, solder the two wires (S-2) in step 2 and disregard step 3. If you intend to operate your Clock from a 50 Hz power source, perform both steps 2 and step 3.

NOTE: Perform the next three steps only if your Clock will be used as a night light. Performing these steps will defeat the automatic dimming feature and provide maximum display brightness at all times.

- () Prepare a 2-1/2" brown wire.
- () Connect this brown wire between holes GA (S-1) and GC (S-1) on the display circuit board as shown by the dashed line on Pictorial 3-6.
- () Adjust control R103 to its mid-range position. See Pictorial 3-6.

- () Locate the 17" violet and blue 2-wire cable. Then separate the two wires and discard the blue wire.

- (✓) Prepare an 8" length of the violet wire. Then connect one end of the wire in display circuit board hole GF (S-1). The other end of the wire will be connected later.

Refer to Pictorial 3-7 (fold-out from Page 43) for the following steps.

Connect the wires at the free end of cable #3 to the case bottom as follows:

- (✓) 1. Brown to SW306 lug 2 (S-2).

- (✓) 2. Red to SW305 lug 2.

- () 3. Connect the free end of the black wire coming from BA on the main circuit board to switch SW305 lug 2 (S-3).

- (✓) 4. Orange to SW306 lug 3 (S-1).

- (✓) 5. Yellow to SW305 lug 5 (S-2).

- (✓) 6. Green to SW306 lug 4 (S-1).

- (✓) 7. Blue to SW306 lug 6 (S-1).

- (✓) Connect the free end of the violet wire coming from the display circuit board to switch SW304 lug 7 (S-1).

Connect the wires at the free end of cable #2 as follows:

- (✓) Gray to speaker SP301 lug 1 (S-1).

- (✓) Violet to speaker SP301 lug 2 (S-1).

- (✓) Connect the free end of the gray wire to SW306 lug 12 (S-1).

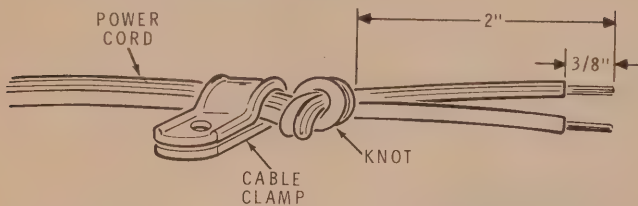
- () Loosely twist together the brown, orange, and violet wires at the free end of cable #4.

Connect the wires at the free end of cable #4 as follows:

- (✓) Brown to SW307 lug 1 (NS).

- (✓) Violet to SW307 lug 1 (S-2).

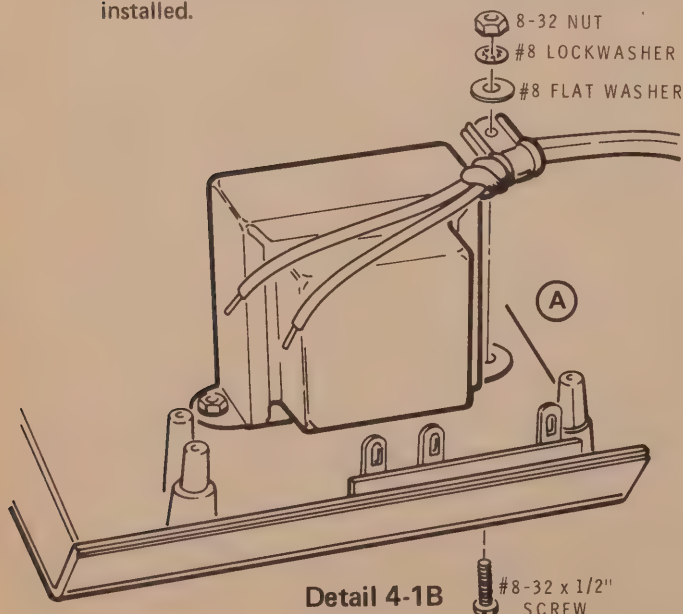
- (✓) Orange to SW307 lug 4 (S-1).
- (✓) Yellow to SW302 lug 5 (S-1).
- (✓) Green to SW303 lug 5 (S-1).
- (✓) Blue to SW304 lug 5 (S-1).
- (✓) Red to SW305 lug 4 (S-1).
- (✓) Gray to SW308 lug 2 (S-1).



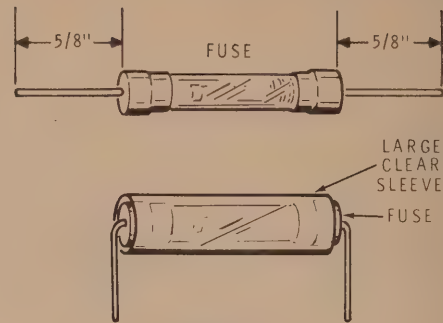
Detail 4-1A

FINAL WIRING

- () Refer to Detail 4-1A and prepare the wire end of the power cord as shown. Twist the strands; then apply a small amount of solder to the wire ends to hold the strands together. Place the cable clamp on the power cord as shown.
- () Remove the 8-32 nut, #8 lockwasher, and #8 flat washer that secures transformer T301 at A. Then refer to Detail 4-1B and secure both the transformer and power cord to the case bottom at A. NOTE: Position the cable clamp as close to the transformer as possible so it will be out of the way when the case back is installed.



Detail 4-1B



Detail 4-1C

- (✓) Connect the smooth power cord lead to terminal strip TS301 lug 1 (NS) and the ribbed power cord lead to lug 2 (NS). See inset #1 on Pictorial 4-1 (fold-out from Page 43).
- (✓) Refer to Detail 4-1C and cut the leads of the 3/16-ampere fuse to 5/8". Then place the large clear sleeve over the fuse and bend the fuse leads as shown. Set the fuse aside until it is called for in a step.

The following wiring procedure is divided into two sections as follows; "Wiring Model GC-1092A" and "Wiring Model GC-1092AE." Perform only the steps in the section that applies to your Clock.

Wiring Model GC-1092A (Transformer #54-859)

CAUTION: The Model GC-1092A Clock operates only from a 120-volt, 60 Hz power source.

Refer to Pictorial 4-1 (fold-out from Page 43) for the following steps.

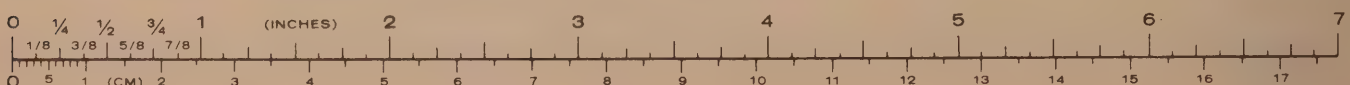
NOTE: Be sure you make mechanically secure connections before you apply any solder. See inset #2.

- (✓) T301: Connect one black lead of transformer #54-859 to terminal strip TS301 lug 2 (S-2) and the other black transformer lead to lug 3 (NS).
- (✓) Connect the previously prepared fuse between terminal strip TS301 lugs 1 (S-2) and 3 (S-2).

Disregard the next section and proceed to "Wiring Case Top" on Page 42.

Wiring Model GC-1092AE (Transformer #54-868)

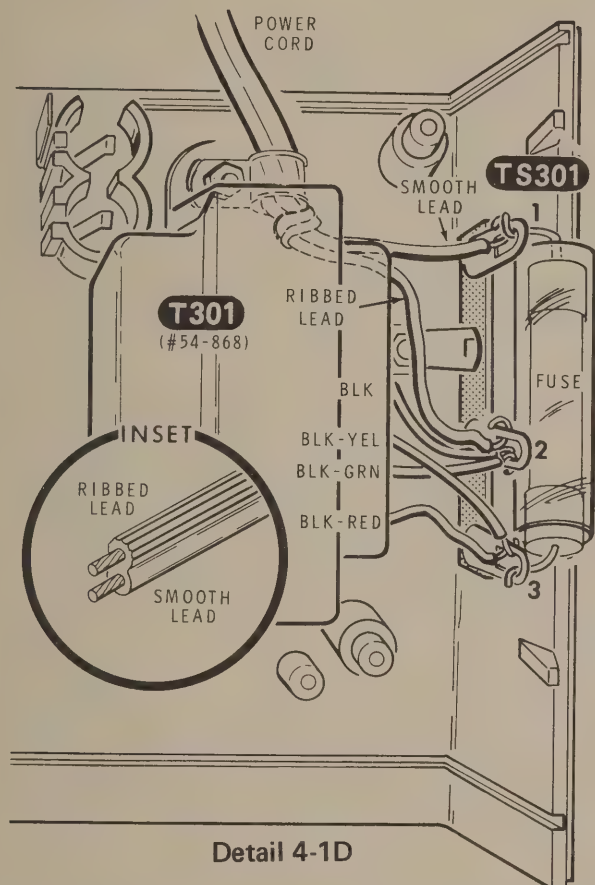
NOTE: The Model GC-1092AE Clock can be wired to operate from a 110-120 volt or 220-240 volt, 50/60 Hz power source.



Alternate Line Voltage Wiring

Two sets of line voltage wiring instructions are given, one for 120-volt operation and the other for 240-volt operation. In the U.S.A., 120 volts is most often used, while in other countries 240 volts is more common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.

120 VAC Wiring

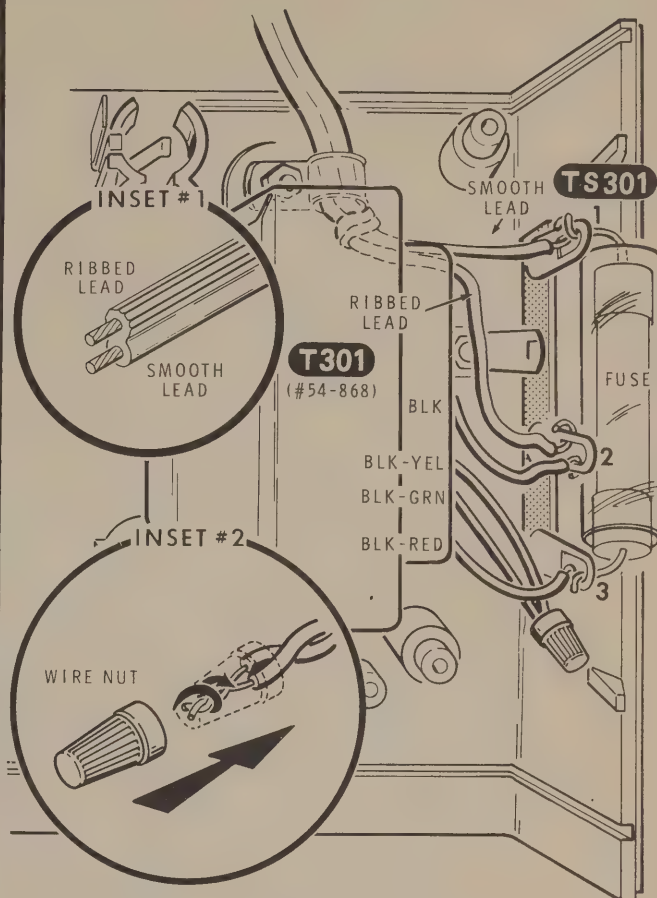


Detail 4-1D

Refer to Detail 4-1D and connect the leads of power transformer T301 (transformer #54-868) to terminal strip TS301 as follows. Be sure you make mechanically secure connections before you apply any solder.

- () Black to lug 2 (NS).
- () Black-green to lug 2 (S-3).
- () Black-yellow to lug 3 (NS).
- () Black-red to lug 3 (NS).
- () F301: Connect the previously prepared fuse between terminal strip TS301 lugs 1 (S-2) and 3 (S-3).

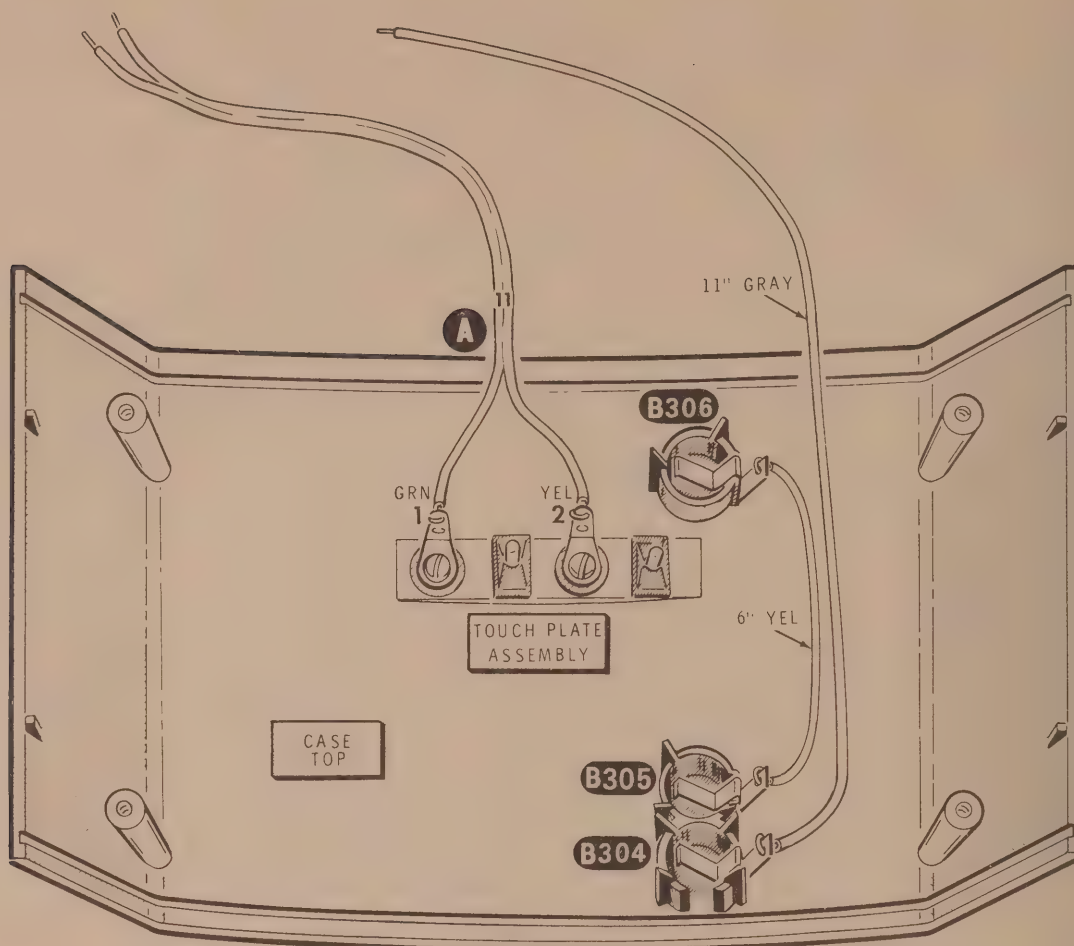
240 VAC Wiring



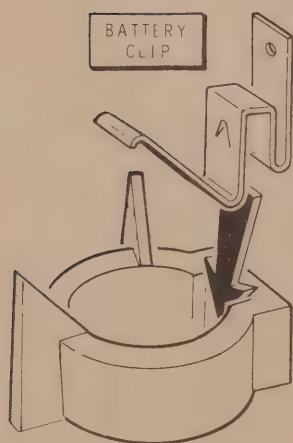
Detail 4-1E

Refer to Detail 4-1E and connect the leads of power transformer T301 (transformer #54-868) to terminal strip TS301 as follows. Be sure you make mechanically secure connections before you apply any solder.

- () Black to lug 2 (S-2).
- () Black-red to lug 3 (NS).
- () Twist the bare ends of the black-yellow and black-green transformer leads together in a clockwise direction. Then turn the wire nut in a clockwise direction onto the twisted together black-yellow and black-green leads as shown in inset drawing #2 on the Detail.
- () F301: Connect the previously prepared fuse between terminal strip TS301 lugs 1 (S-2) and 3 (S-2).



PICTORIAL 4-2

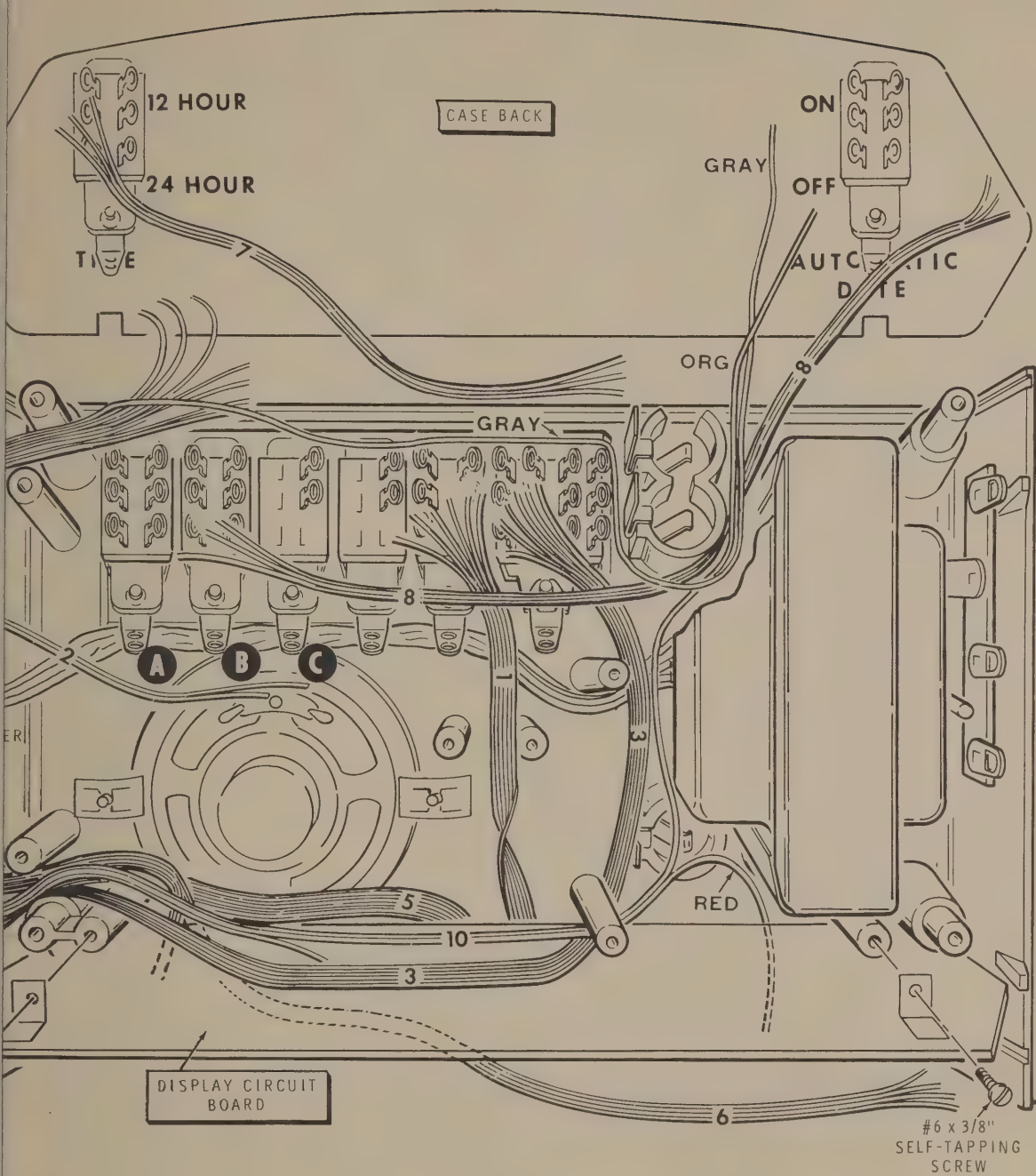


Detail 4-2A

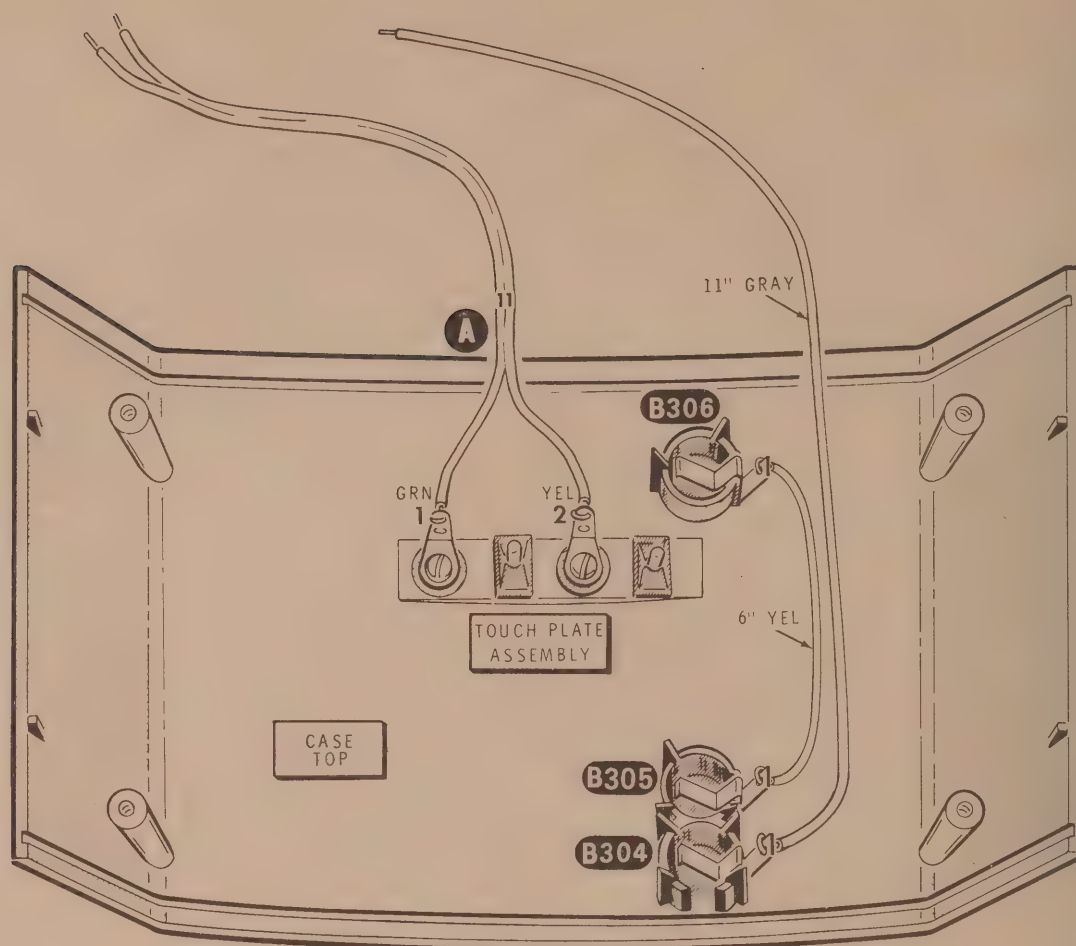
Wiring Case Top

Refer to Pictorial 4-2 for the following steps.

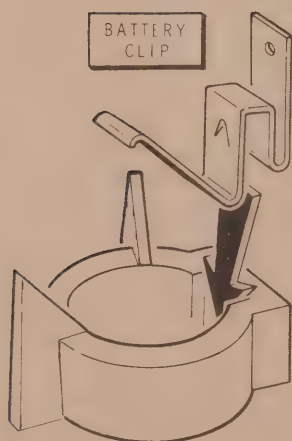
- () Place a soft cloth on your work bench to protect the painted surface of the case top while you perform the following steps.
- () Refer to Detail 4-2A and install battery contacts in the case top at locations B304, B305, and B306. Position the contacts as shown in the Pictorial; then press them firmly into the battery mounting holes.



PICTORIAL 5-1



PICTORIAL 4-2

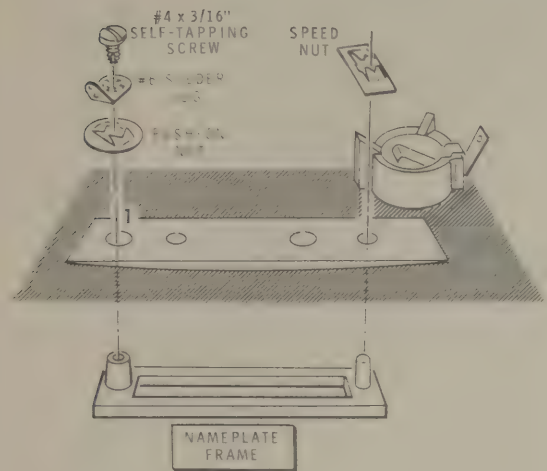


Detail 4-2A

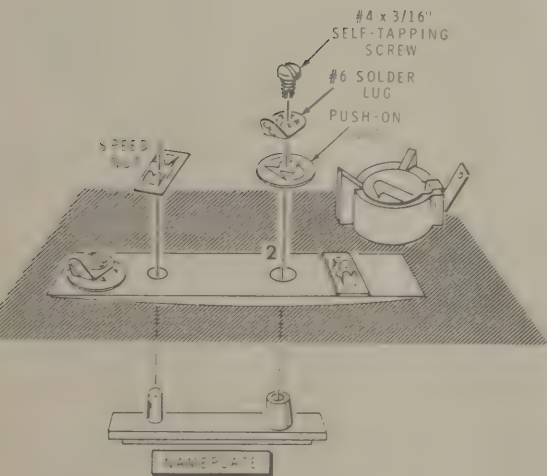
Wiring Case Top

Refer to Pictorial 4-2 for the following steps.

- () Place a soft cloth on your work bench to protect the painted surface of the case top while you perform the following steps.
- () Refer to Detail 4-2A and install battery contacts in the case top at locations B304, B305, and B306. Position the contacts as shown in the Pictorial; then press them firmly into the battery mounting holes.



Detail 4-2B



Detail 4-2C

() Refer to Detail 4-2B and install the nameplate frame on the outside of the case top. Use a push-on nut and a #6 Speed Nut on the inside of the case top as shown. Press the push-on nut and the Speed Nut firmly against the inside surface of the case top.

() Mount a #6 solder lug at 1 on the nameplate frame with a #4 x 3/16" self-tapping screw. Do not overtighten the screw.

() Refer to Detail 4-2C and install the HEATHKIT nameplate (#391-90) in the nameplate frame. Use a push-on nut and a #6 Speed Nut on the inside of the case top as shown. Press the push-on nut and the Speed Nut firmly against the inside surface of the case top.

() Mount a #6 solder lug at 2 on the nameplate with a #4 x 3/16" self-tapping screw. Do not overtighten the screw.

To prepare a wire, remove 1/4" of insulation from each end. Twist the strands and apply a small amount of solder to the wire ends to hold the fine strands together.

() Refer to Detail 4-2D (fold-out from Page 38) and prepare an 8" length of the 17" yellow and green 2-wire cable. Mark this cable #11 at the two indicated locations.

Connect one end of cable #11 to the touch plate assembly as follows:

(✓) Yellow to solder lug 2 (S-1).

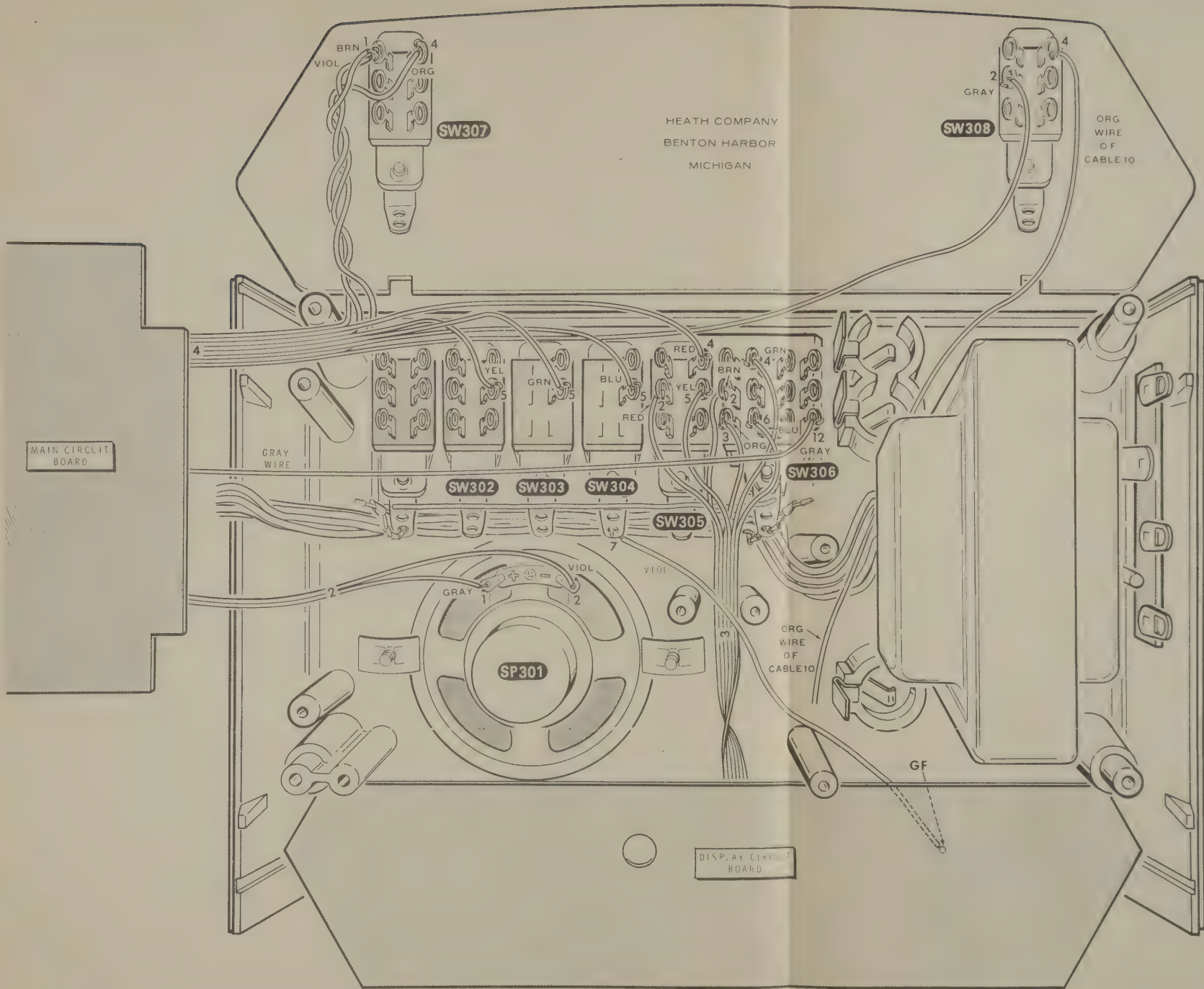
(✓) Green to solder lug 1 (S-1).

The other end of cable #11 will be connected later.

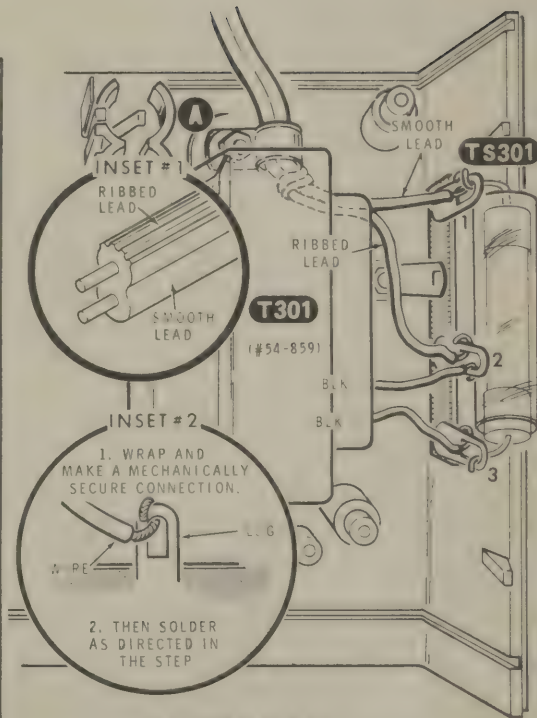
() Separate the wires of the remaining yellow and green 2-wire cable.

(✓) Connect a 6" yellow wire from B305 (S-1) to B306 (S-1).

(✓) Connect an 11" gray wire to B304 (S-1). The other end will be connected later.

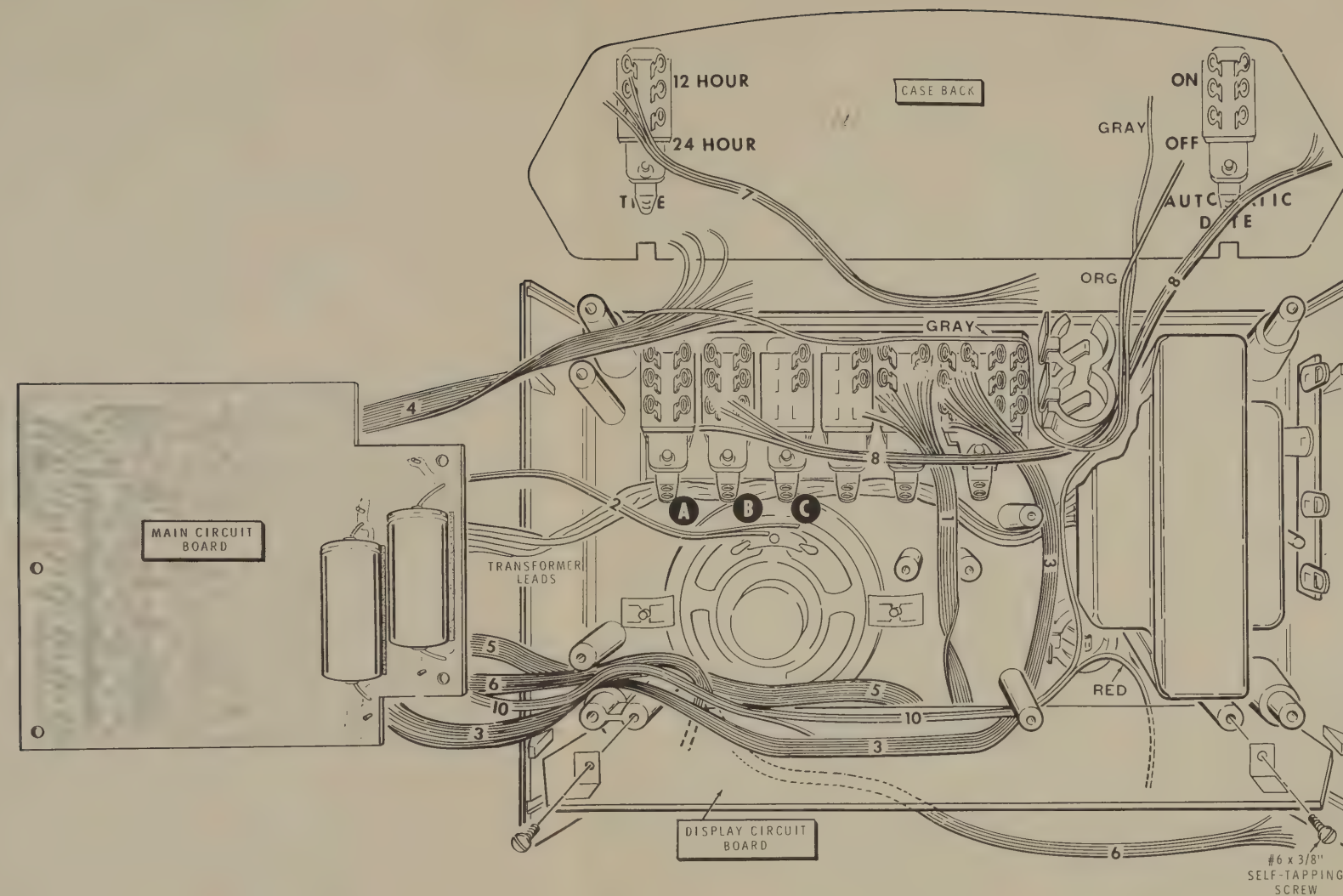


PICTORIAL 3-7



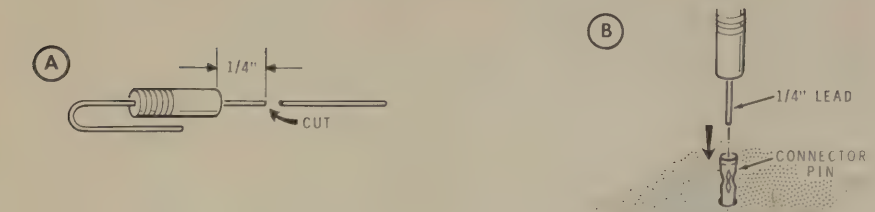
PICTORIAL 4-1





PICTORIAL 5-1

FINAL ASSEMBLY



Detail 5-2A

Refer to Pictorial 5-1 (fold-out from this page) for the following steps.

NOTE: Do not be concerned by the rather confusing appearance of your clock at this time. The connecting cables are designed to be folded and positioned as needed so you will obtain a neat and compact finished unit.

CAUTION: Be careful you do not damage the speaker when you perform the next step.

(/) Using a screwdriver or other suitable tool, carefully bend down the solder lugs at locations A, B, and C.

(/) Carefully position the cables attached to the display circuit board out of the way. Then secure the display circuit board to the case bottom with #6 x 3/8" self-tapping screws at the two locations shown.

(/) Position the red, green, and yellow transformer leads straight out from the left end of the case bottom for connection later.

() Position the wires and cables attached to the circuit boards, case bottom, and case back, as shown in the Pictorial. A long slim object with a blunt chisel end, such as a wooden dowel, is ideal for pressing the wires and cables into position.

Refer to Pictorial 5-2 (fold-out from Page 47) for the following steps.

() Be sure the cables are positioned as shown in Pictorial 5-1. Then fold the main circuit board back over the components on the case bottom as shown in Pictorial 5-2. Secure the main circuit board with #4 x 3/8" self-tapping screws at the four locations shown. Do not overtighten the screws.

The resistor you prepare in the next step will be used as a tool to enlarge the opening in each of the connector pins on the display circuit board.

() Refer to Detail 5-2A and prepare the remaining 10 MΩ (brown-black-blue), 1/4-watt resistor as shown.

() Push the shortened lead of the resistor into each of the 57 connectors on the display circuit board. This will slightly enlarge the holes in the connector pins. **NOTE:** The resistor may be discarded after the connector pins have been enlarged.

() Cut the bare wire ends of the red, green, and yellow transformer leads to 1/4".

Refer to inset #1 and insert the wire ends of the transformer leads into circuit board connector pins as follows. Be sure none of the wires or connector pins touch each other.

(/) Either red lead to pin T (S-1).

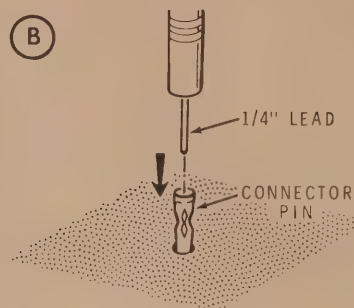
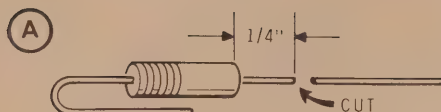
(/) Other red lead to pin U (S-1).

(/) Either green lead to pin X (S-1).

(/) Other green lead to pin Y (S-1).

(/) Yellow lead to pin Z (S-1).

FINAL ASSEMBLY



Detail 5-2A

Refer to Pictorial 5-1 (fold-out from this page) for the following steps.

NOTE: Do not be concerned by the rather confusing appearance of your clock at this time. The connecting cables are designed to be folded and positioned as needed so you will obtain a neat and compact finished unit.

CAUTION: Be careful you do not damage the speaker when you perform the next step.

- (/) Using a screwdriver or other suitable tool, carefully bend down the solder lugs at locations A, B, and C.
- (/) Carefully position the cables attached to the display circuit board out of the way. Then secure the display circuit board to the case bottom with #6 x 3/8" self-tapping screws at the two locations shown.
- (/) Position the red, green, and yellow transformer leads straight out from the left end of the case bottom for connection later.
- () Position the wires and cables attached to the circuit boards, case bottom, and case back, as shown in the Pictorial. A long slim object with a blunt chisel end, such as a wooden dowel, is ideal for pressing the wires and cables into position.

Refer to Pictorial 5-2 (fold-out from Page 47) for the following steps.

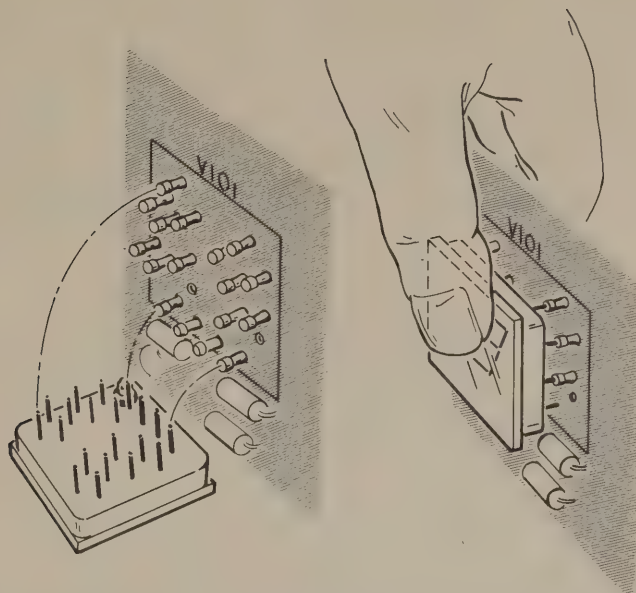
- () Be sure the cables are positioned as shown in Pictorial 5-1. Then fold the main circuit board back over the components on the case bottom as shown in Pictorial 5-2. Secure the main circuit board with #4 x 3/8" self-tapping screws at the four locations shown. Do not overtighten the screws.

The resistor you prepare in the next step will be used as a tool to enlarge the opening in each of the connector pins on the display circuit board.

- () Refer to Detail 5-2A and prepare the remaining 10 MΩ (brown-black-blue), 1/4-watt resistor as shown.
- () Push the shortened lead of the resistor into each of the 57 connectors on the display circuit board. This will slightly enlarge the holes in the connector pins. **NOTE:** The resistor may be discarded after the connector pins have been enlarged.
- () Cut the bare wire ends of the red, green, and yellow transformer leads to 1/4".

Refer to inset #1 and insert the wire ends of the transformer leads into circuit board connector pins as follows. Be sure none of the wires or connector pins touch each other.

- (/) Either red lead to pin T (S-1).
- (/) Other red lead to pin U (S-1).
- (/) Either green lead to pin X (S-1).
- (/) Other green lead to pin Y (S-1).
- (/) Yellow lead to pin Z (S-1).



Detail 5-2B

NOTES:

1. A total of five pins on the three display tubes will not be used, two each at locations V101 and V102, and one at location V103. There are no display tube connectors for these five pins to be inserted into. However, there are five matching holes in the display circuit board for them to enter. Be careful when you handle and install the display tubes so you do not bend the pins.
2. When you install a display tube in the following steps, support the rear of the display circuit board as shown in the Detail to prevent breaking the circuit board. Press evenly on the tube and work the pins all the way into their connectors.
3. Before you install a display tube, check its pins to be sure they are not bent. Straighten any bent pin before you start to install the tube.

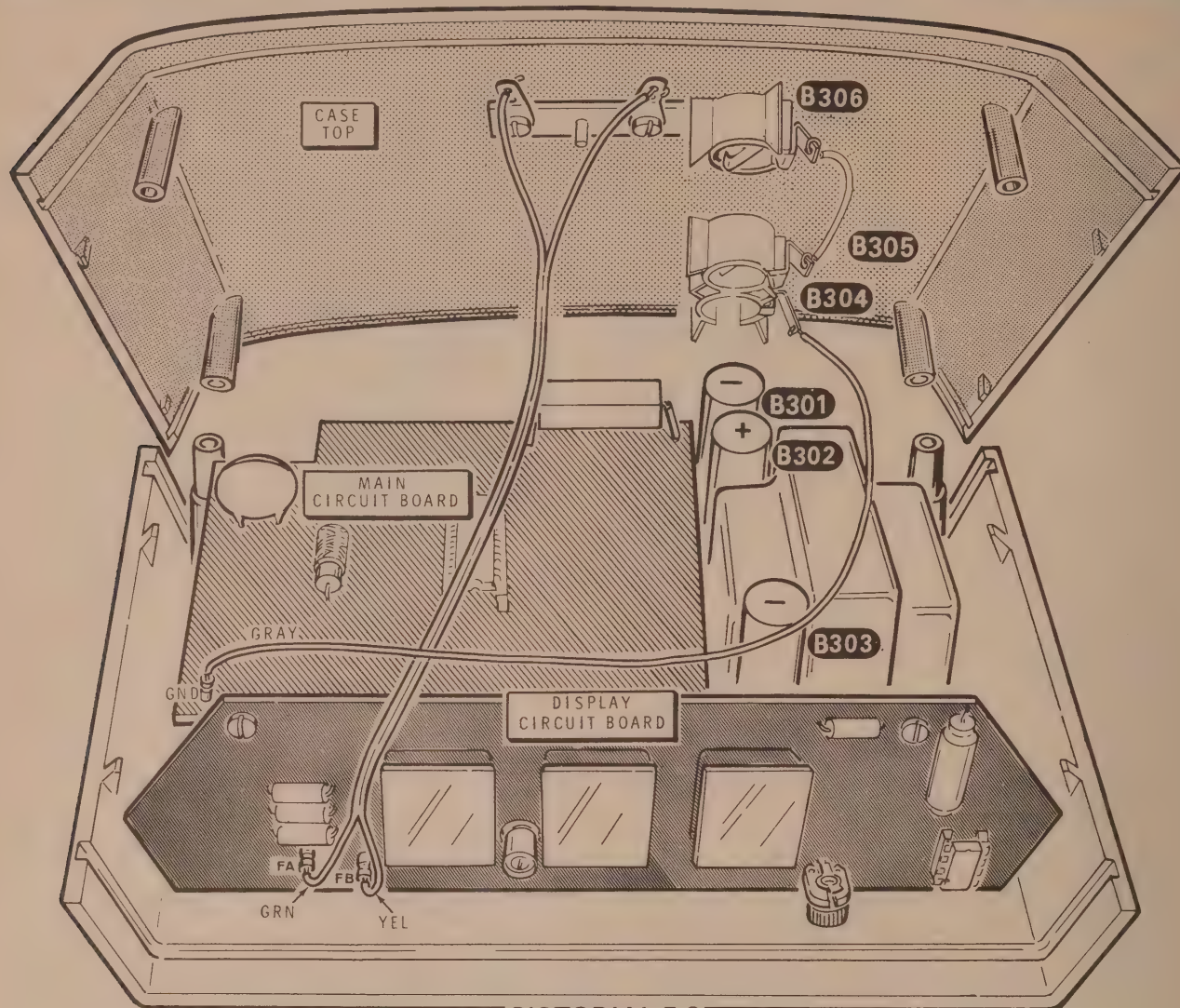
() Refer to Detail 5-2B and install a display tube at V101. Watch carefully as you install the tube and make sure each tube pin enters its connector or circuit board hole.

() In a like manner, install display tubes at V102 and V103.

CAUTION: Integrated circuit MK5017AA (#443-687) is packaged with its pins inserted into a conductive foam pad, which prevents an electrostatic voltage buildup that could damage the IC. To avoid damaging the IC when you install it, pick it up by the ends so your fingers will have minimum contact with the IC pins. **NOTE:** Save the foam pad and container. If you have to remove the IC from the circuit board for any reason, you can protect the IC by temporarily inserting the IC pins into the conductive foam pad.

() Refer to inset #2 of Pictorial 5-2 (fold-out from Page 47). Then position the dot or notch end of the MK5017AA integrated circuit (#443-687) over the half dot on the outline of IC201 on the main circuit board.

() Carefully guide the IC pins into the holes in the socket strips. Be sure each IC pin is entered into the proper hole in each socket strip; then press the IC firmly into place.



PICTORIAL 5-3

Refer to Pictorial 5-3 for the following steps.

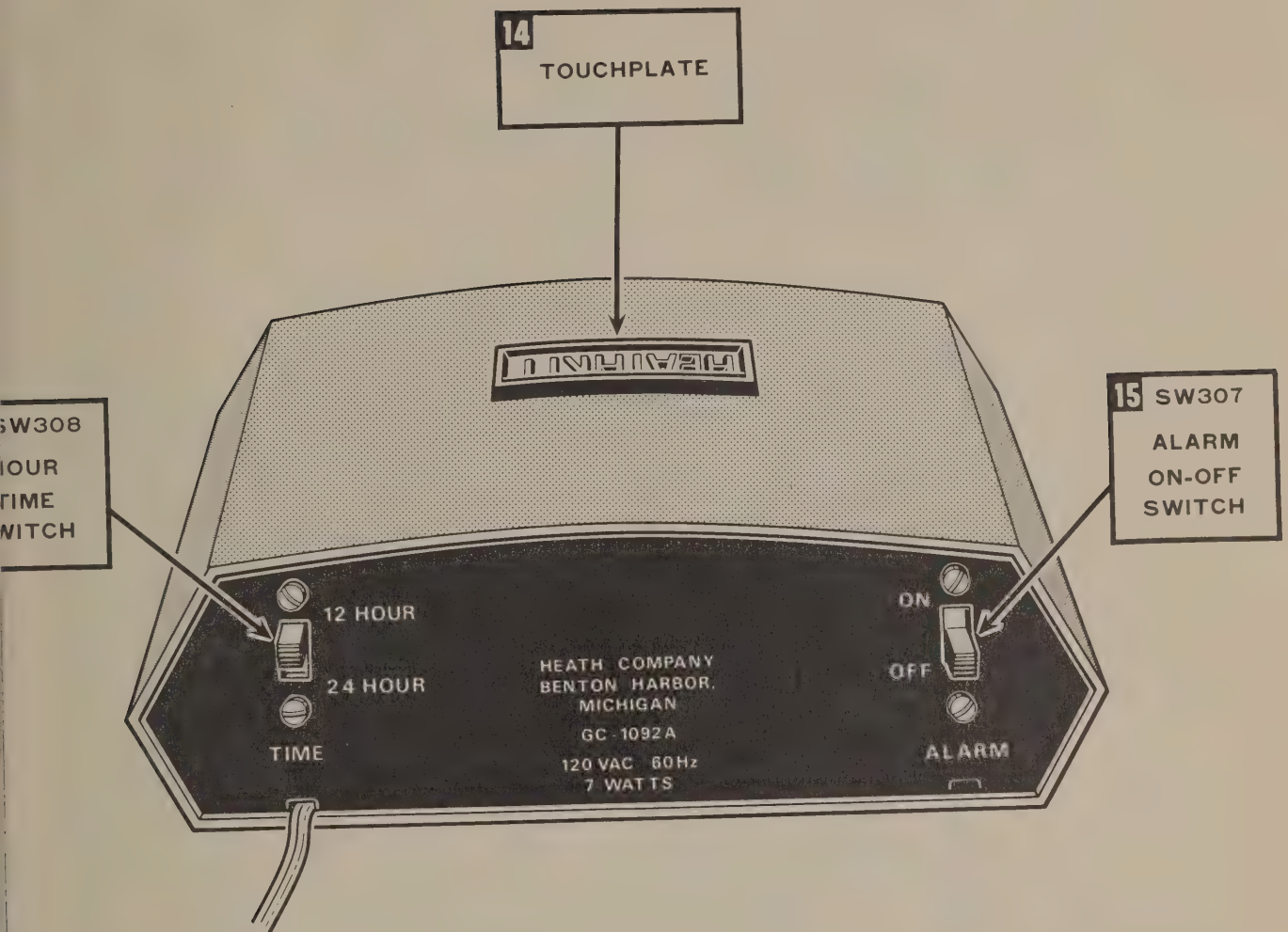
NOTE: Most penlight batteries have the polarity indicated by a + sign on one side near the positive end of the battery. Note that for clarity only, Pictorial 5-3 shows the polarity on the end of each battery - to make sure you install them properly.

- () If batteries will be used, install three AA size batteries at B301, B302, and B303 in the case bottom. Be sure the positive (+) end of each battery is positioned as shown.
- () Position the case back in the groove at the rear of the case bottom. Position the wires so they will not interfere with the seating of the case back. Be sure the power cord is in the notch in the case back.

green and yellow wires of cable #11, into the following circuit board connectors.

- () Gray to GND on the main circuit board.
- () Green to FA on the display circuit board.
- () Yellow to FB on the display circuit board.
- () Position the wires and cables along the front of the case bottom back out of the way under the display circuit board; then place the case front in the groove at the front of the case bottom.
- () Carefully fit the top onto the rest of the case. **CAUTION:** Be sure the top fits down over the batteries and that both the front and the back of the case is seated in the grooves in the bottom and top of the case.

Hold the previously prepared case top as shown in the Pictorial. Then insert the free ends of the gray wire, and

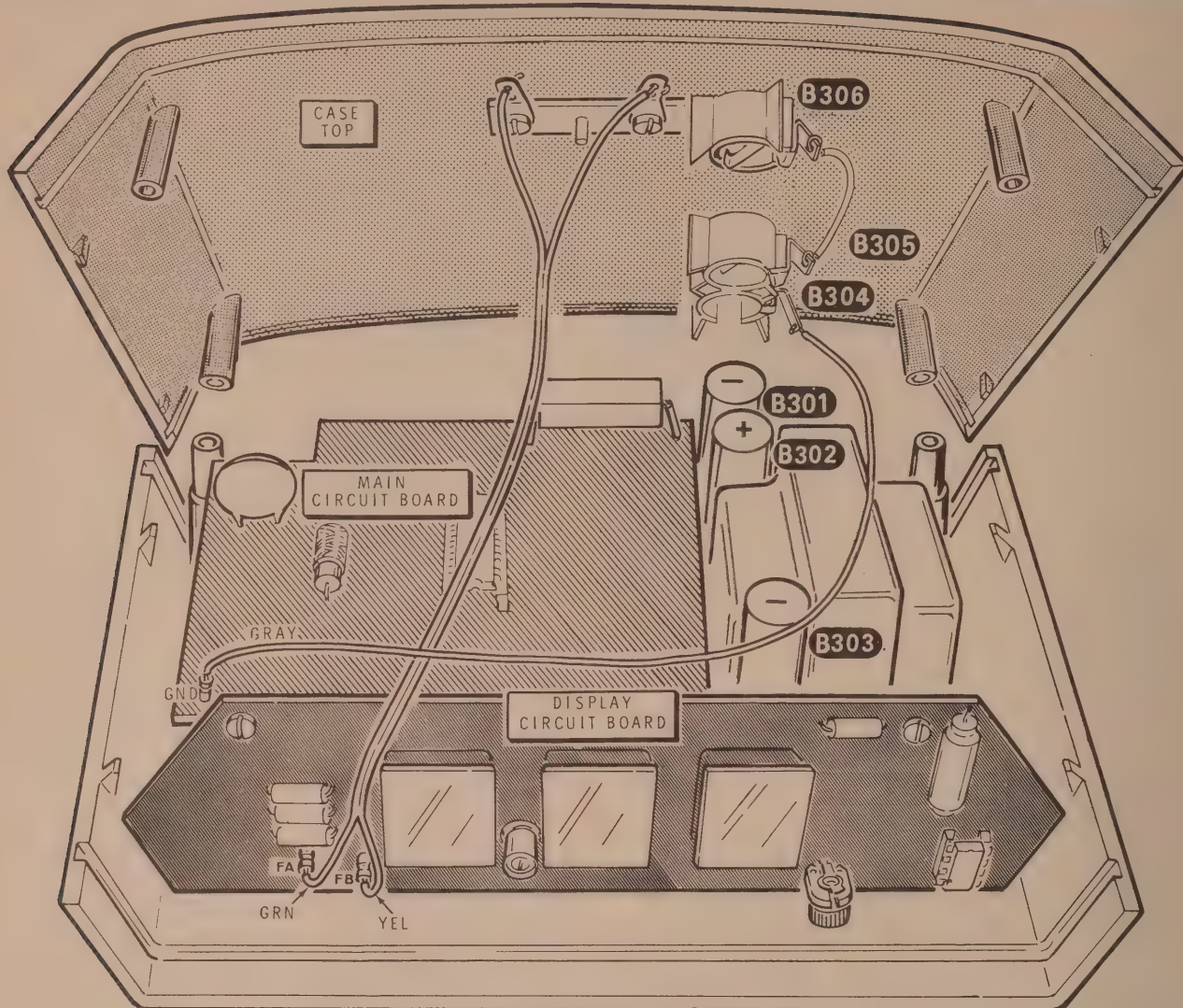


POWER LABEL

**GC-1092AE
120/240 VAC 50/60 Hz
7 WATTS**

If you assembled the Model GC-1092A Clock, discard power label #390-1078 (shown above).

If you assembled the Model GC-1092AE Clock, remove the backing paper from power label #390-1078. Then place the label on the case back so it covers the GC-1092A model and power information.



PICTORIAL 5-3

Refer to Pictorial 5-3 for the following steps.

NOTE: Most penlight batteries have the polarity indicated by a + sign on one side near the positive end of the battery. Note that for clarity only, Pictorial 5-3 shows the polarity on the end of each battery - to make sure you install them properly.

- () If batteries will be used, install three AA size batteries at B301, B302, and B303 in the case bottom. Be sure the positive (+) end of each battery is positioned as shown.
- () Position the case back in the groove at the rear of the case bottom. Position the wires so they will not interfere with the seating of the case back. Be sure the power cord is in the notch in the case back.

green and yellow wires of cable #11, into the following circuit board connectors.

- () Gray to GND on the main circuit board.
- () Green to FA on the display circuit board.
- () Yellow to FB on the display circuit board.
- () Position the wires and cables along the front of the case bottom back out of the way under the display circuit board; then place the case front in the groove at the front of the case bottom.
- () Carefully fit the top onto the rest of the case. CAUTION: Be sure the top fits down over the batteries and that both the front and the back of the case is seated in the grooves in the bottom and top of the case.

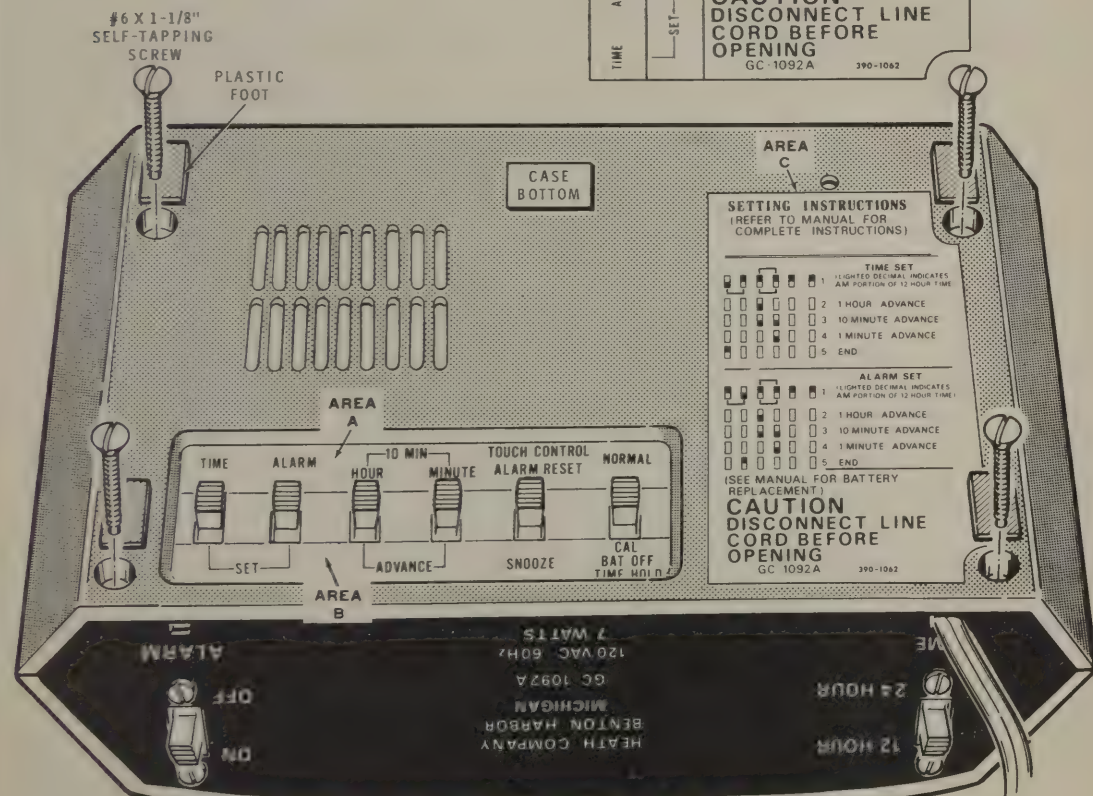
Hold the previously prepared case top as shown in the Pictorial. Then insert the free ends of the gray wire, and

Refer to Pictorial 5-4 for the following steps.

- () Carefully turn the clock over. Then secure the top and bottom together with #6 x 1-1/8" self-tapping screws at the four indicated locations.

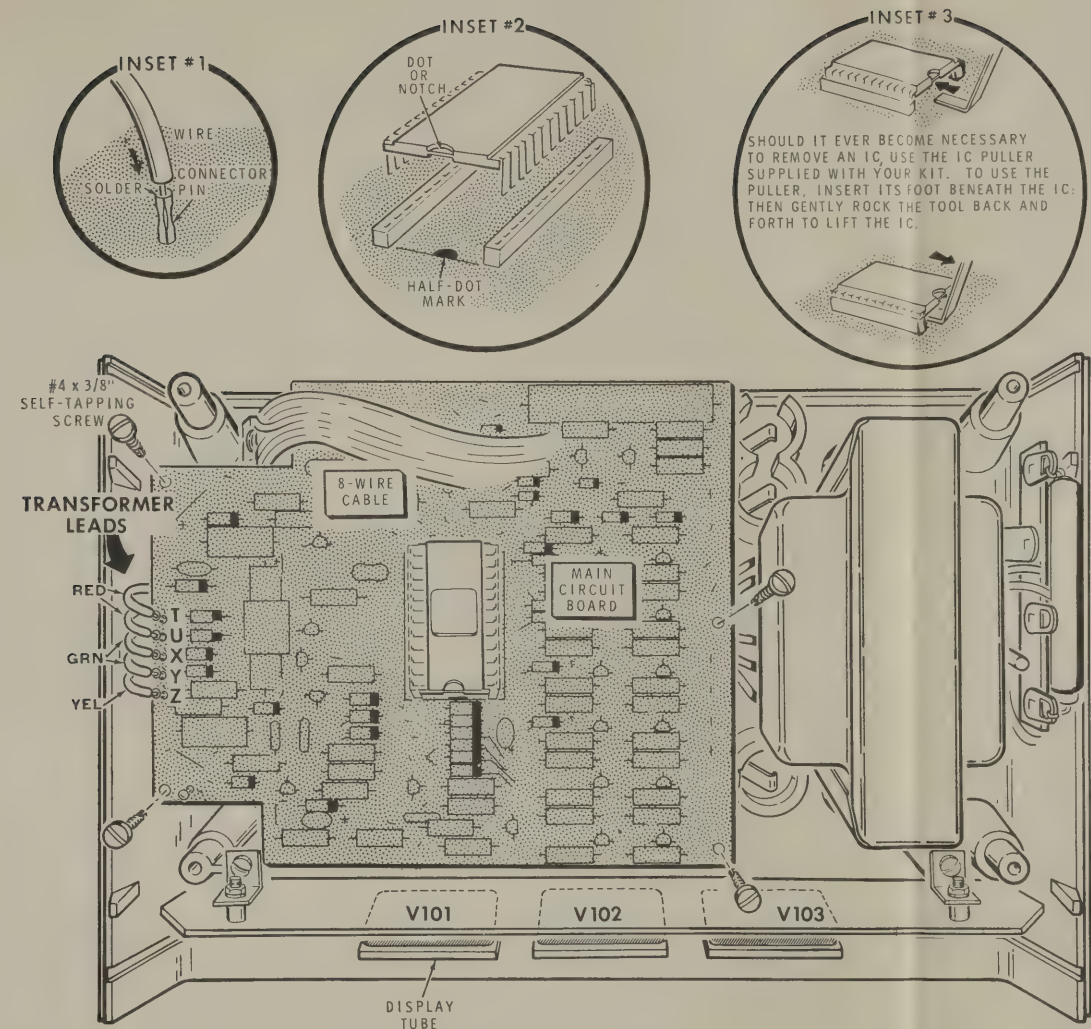
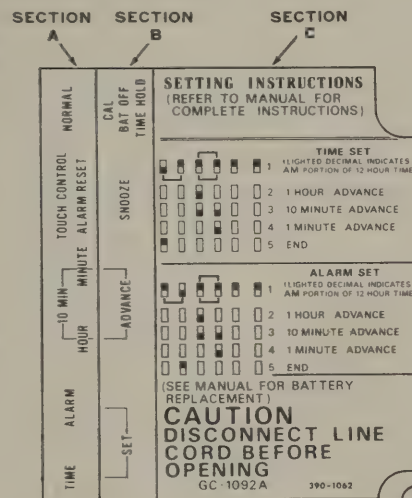
NOTE: Switch label #390-1062 is a 3-section pressure sensitive adhesive label. In the following steps, you will peel each section off its paper backing and place it on the bottom of the case.

- () Peel off section A and carefully place it on area A.
- () Peel off section B and carefully place it on area B.
- () Peel off section C and carefully place it on area C.
- () Remove the paper backing from four of the plastic feet. Then firmly press the feet on the bottom of the case at the four indicated locations.



PICTORIAL 5-4

If you intend to use the Clock without its pedestal base, you have completed the assembly of the kit. If you want to mount your Clock on the adjustable pedestal base, perform the steps on Page 52.



PICTORIAL 5-2

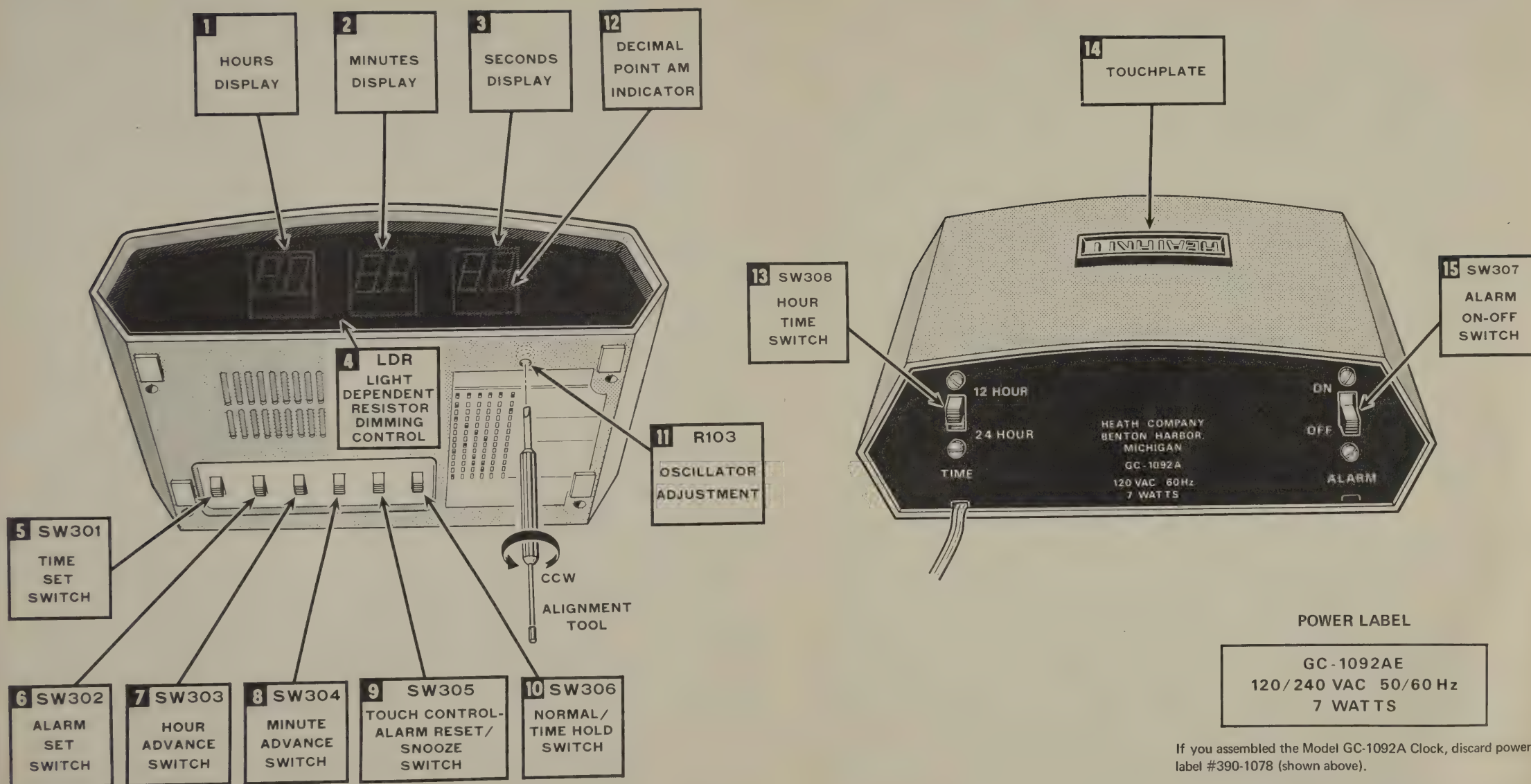


Figure 2

If you assembled the Model GC-1092A Clock, discard power label #390-1078 (shown above).

If you assembled the Model GC-1092AE Clock, remove the backing paper from power label #390-1078. Then place the label on the case back so it covers the GC-1092A model and power information.

TEST AND ADJUSTMENTS

Refer to Figure 2 (fold-out from this page) to identify the function and location of each switch on your Clock.

Each line across the Setting Instruction label on the bottom of the Clock represents the row of six switches on the bottom of the Clock. Each line shows the position in which you should place the indicated switch (or switches) in order to set the time or alarm of your Clock. Practice using these switches and note their effect on the display until you become familiar with their function. After the time and/or alarm has been set, all of the switches should be in their (normal) positions.

NOTES:

1. The HOUR ADVANCE and MINUTE ADVANCE switches are spring return switches and must be held in the down position until the desired display is obtained.
2. If you do not obtain the proper result in any of the following steps, unplug the power cord; then refer to the "In Case of Difficulty" section on Page 53 of this Manual.
3. Refer to the "Power Label" information on Figure 2.

Refer to Figure 2 for the following steps.

Place the switches, on the case back, in the following positions.

- () TIME switch (SW308) in 24 HOUR position.
- () ALARM switch (SW307) in OFF position.

Place the switches on the case bottom in the following positions.

- () TIME SET switch (SW301) in the TIME position.
- () ALARM SET switch (SW302) in the ALARM position.
- () TOUCH CONTROL switch (SW305) in the SNOOZE position.
- () NORMAL/TIME HOLD switch (SW306) in the NORMAL position.
- () Insert the power cord plug in an AC outlet. Within 5 seconds, each of the six digits should indicate the number 8.

CHECK AND SET TIME

- () Place the NORMAL/TIME HOLD switch (SW306) in the CAL position.

NOTE: If you have wired your Clock for "night-light" use, do not perform steps 1 and 2 but proceed to step 3.

- () 1. R103: Carefully hold the clock in the position shown in Figure 2. Then, using the screwdriver end of the alignment tool or a small-blade screwdriver, turn control R103 fully counterclockwise. This should cause the display tubes to flash rapidly.
- () 2. Now very slowly turn control R103 clockwise until the display tubes stop flashing. Then place the NORMAL/TIME HOLD switch (SW306) back in the NORMAL position.
- () 3. SW301: Place the TIME switch on the case bottom in the SET position. The display should now indicate 00:00:00 (midnight, 24-hour time).
- () SW308: Place the 12-24 HOUR switch in the 12-HOUR position. The display should indicate 12:00:00 (midnight, 12-hour time) with the AM indicator on.
- () Place the TIME switch (SW301) on the bottom of the case in the TIME position. The "seconds" section of the display should start to count and the AM indicator turn off.
- () Place TIME switch (SW301) back in the SET position.
- () Push the HOUR ADVANCE switch (SW303) and hold it in the ADVANCE position. The "hours" section of the display should advance one hour each half second as long as the switch is held in the ADVANCE position. Note that the decimal point AM indicator will be on only when the clock is in, or counting through, the 12 midnight to 12 noon portion of the hours advance display.
- () SW303 and SW304: Simultaneously push down the HOUR and MINUTES switches and hold them in the ADVANCE position. The "minutes" section of the display should advance ten minutes each half second, as long as the switch is in the ADVANCE position.
- () SW304 only: Push down the MINUTES switch and hold it in the ADVANCE position. The "minutes"

section of the display should advance one minute each half second, as long as the switch is in the ADVANCE position.

CHECK AND SET ALARM

In the following steps you will be checking as well as setting the electronic touch control circuitry to assure proper operation of the alarm functions of your clock. Therefore, all steps must be performed in the indicated sequence and each step completed before you proceed to the next step.

CAUTION: If for any reason you are interrupted while performing one step of the procedure, you must go back and perform all of the steps in the procedure over again.

- () Using the procedure described in "Check and Set Time," set the display to read 6:45 (AM indicator on).
- () Place the ALARM SET switch (SW302) on the case bottom in the SET position and the ALARM switch (SW307) on the case back in the OFF position.
- () Push down the HOUR ADVANCE switch (SW303). Continue to hold the switch down until the hours display indicates 6 with the AM indicator on. Then quickly release the switch.
- () Simultaneously push down and hold the HOUR ADVANCE (SW303) and MINUTE ADVANCE (SW304) switches in the ADVANCE position until the "tens of minutes" display indicates 40; then quickly release the switches.
- () Push down and hold only the MINUTE ADVANCE switch (SW304) until the minutes display indicates 46; then quickly release the switch. The display should now indicate 6:46 with the AM indicator on.
- () Place the ALARM switch (SW307) on the case back in the ON position.
- () Place the ALARM SET switch (SW302) on the case bottom in the ALARM position. Then place the TIME SET switch (SW301) in the TIME position. The AM indicator will turn off and the alarm should sound in 60 seconds when the display reads 6:46. After the alarm sounds, touch the Touch Plate in the case top to stop the alarm.
- () Wait for about seven minutes; then the alarm should sound again.
- () When the alarm sounds again after the approximately seven-minute pause, place the ALARM switch (SW307) on the case back in the OFF position to turn the alarm off.
- () Place the TOUCH CONTROL switch (SW305) in the ALARM RESET position.
- () Place the TIME SET switch (SW301) on the case bottom in the SET position.
- () Refer to the "Check and Set Time" steps and, with the AM indicator on, set the time to 6:45.
- () Place the ALARM switch (SW307) on the case back in the ON position.
- () Place the TIME SET switch (SW301) on the case bottom in the TIME position. The alarm should sound in 60 seconds when the display reads 6:46.
- () Touch the Touch Plate on the case top to stop the alarm. The alarm is now set to sound again in 24 hours.

LIGHT DEPENDENT RESISTOR (LDR) TEST

NOTE: If you previously defeated the automatic dimming feature of your clock display, disregard the following steps.

- () Expose the front of the Clock to a bright light. The display tubes should adjust to maximum brightness.
- () Now shade the front of the Clock. The display tubes should reduce in brightness if the LDR is operating properly.

BATTERY OPERATION CHECK

NOTES:

1. Perform the following steps only if you have installed batteries in your Clock. If no batteries were installed, proceed to "Operation."
 2. The batteries should be fully charged in order to obtain the proper result in the following steps.
- () Note the reading of the display. Then temporarily unplug the power cord and note that the display tubes no longer light up.
 - () Wait for about thirty seconds; then plug the cord back into the power outlet. Even if the batteries were only partially charged, the Clock should have continued to keep time and the seconds have continued to count.

This completes the Test and Adjustments. If you do not want to reduce the alarm volume, proceed to "Operation."

TO REDUCE ALARM VOLUME

NOTE: If the alarm is too loud, you can reduce its volume by performing the following steps.

- () Unplug the power cord from the AC outlet.
- () Place the Clock on its top and remove the four #6 x 1-1/8" screws that secure the case top to the case bottom. Then turn the Clock over and remove the case top.
- () Refer to Figure 3 and remove the .047 μ F Mylar capacitor, C210, from the top of the main circuit board. This capacitor may be unsoldered or clipped out with a pair of small side cutters.

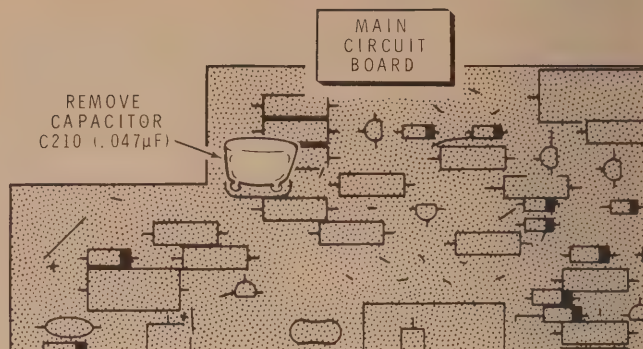


Figure 3

- () Carefully replace the case top and secure it with the #6 x 1-1/8" self-tapping screws previously removed.
- () Plug the power cord into an AC outlet. Then set the clock as described under "Check and Set Time" on Page 48 and "Check and Set Alarm" on Page 49.

OPERATION

Figure 2 (fold-out from Page 48) briefly points out the displays and function switches of your Clock. These displays and switch functions are further described in the following paragraphs. **NOTE:** If you have fully charged batteries in your Clock and the AC power is interrupted, the Clock will continue to keep time but no display will occur. If battery power is also interrupted due to discharged batteries for example, the Clock will stop keeping time and the next display after AC power is restored will be 88:88:88.

NOTE: Each time you reset the alarm to sound at a new time, you should momentarily switch the ALARM switch (SW307) on the case back to the OFF and then back to the ON position. This will reset the electronic memory so the alarm will sound at the proper time.

SETTING INSTRUCTIONS

NOTE: The time must be set before the ALARM can be set.

Time Set

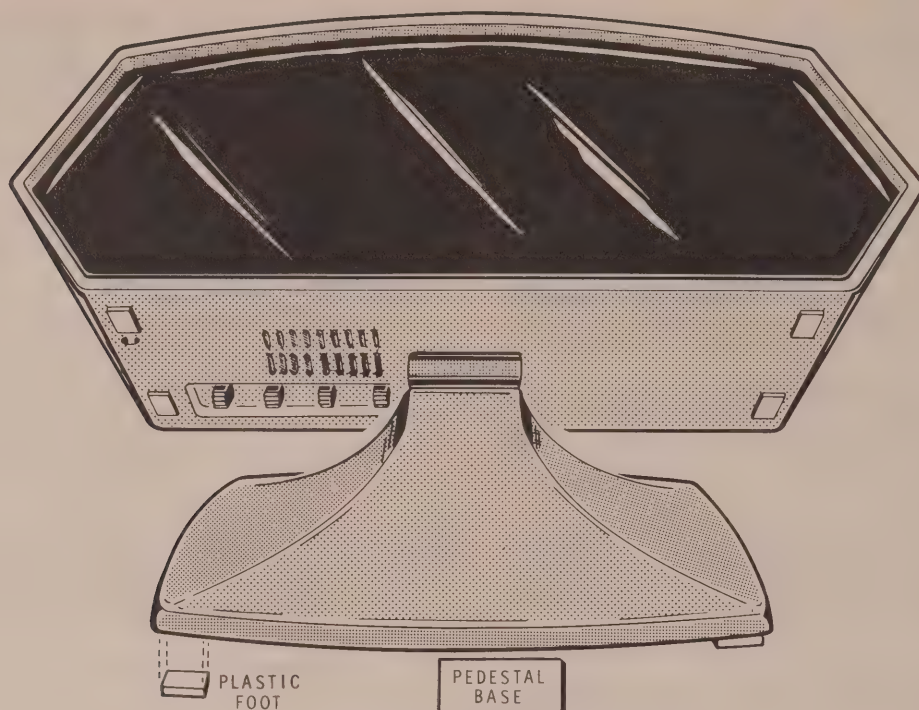
Refer to the SETTING INSTRUCTIONS on the bottom of the Clock. The following numbered paragraphs refer to the correspondingly numbered boxes of Figure 2 and also more fully describe the switch functions obtained when the various switches are positioned according to the SETTING INSTRUCTIONS. All 8's will be displayed when the Clock is first plugged in.

1. **HOURS DISPLAY** — Indicates the hours of the display. Will show 12- or 24-hour time depending on the setting of the TIME switch on the back of the case.
2. **MINUTES DISPLAY** — Indicates the minutes of the display. This display will be the same for 12- or 24-hour time.
3. **SECONDS DISPLAY** — Indicates the seconds of the display. After the time and the alarm have been set, and the Clock is operating, the Clock will count and display each second. **NOTE:** There is a decimal point AM indicator located at the lower right corner of the SECONDS DISPLAY which can light only when TIME switch SW308 is in the 12 HOUR position. Also, this AM indicator will light only while you are performing the Time or Alarm setting procedures, and then only during the time the Clock is counting through the twelve hour AM portion of the time interval.
4. **LDR** — This is a light dependent resistor. It senses the amount of light in the room and accordingly controls the display brightness. The less light in the room, the dimmer the display will be. **NOTE:** The brightness of the display will not change if the automatic dimming feature has been defeated.

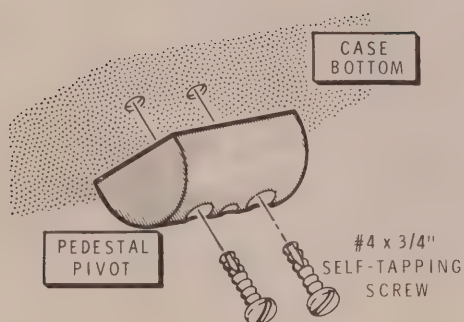
5. **TIME SET Switch** — Allows you to set the time using the HOUR and/or MINUTES switches. NOTE: The NORMAL/TIME HOLD switch must be in the NORMAL position to set the time or alarm.
6. **ALARM SET Switch** — Allows you to set the alarm using the HOUR and/or MINUTES switches.
7. **HOUR ADVANCE Switch** — Advances the HOURS DISPLAY one hour every half second for either 12-hour or 24-hour time.
8. **MINUTE ADVANCE Switch** — Advances the minutes display, 1 through 9, every half second for either 12-hour or 24-hour time.
- 7 & 8. **HOUR ADVANCE-MINUTE ADVANCE Switches** — When both are used simultaneously, they will advance the minutes display ten minutes every half second for either 12-hour or 24-hour time.
9. **TOUCH CONTROL-ALARM RESET/SNOOZE Switch** — In the ALARM RESET position, after the alarm sounds, touching the TOUCH PLATE or momentarily moving the ALARM switch on the back of the case to the OFF position will reset the alarm to sound again in 24 hours.

In the SNOOZE position, and after the alarm sounds, touching the TOUCH PLATE will reset the alarm to seven minutes. To stop the alarm from repeating at 7-minute intervals, momentarily place ALARM switch SW307 on the case back into the OFF and then back in the ON position; thus resetting the alarm to sound again in twenty-four hours.
10. **TIME HOLD SWITCH** — Allows you to start the SECONDS DISPLAY counting at an exact future time. Use the HOUR and MINUTE switches to set the Clock; then when the desired time is reached, place the TIME HOLD switch in the NORMAL position.

This will start the clock counting. NOTE: When this switch is in the NORMAL/TIME HOLD position, the batteries are disconnected from the clock circuitry. Also, neither the time or the alarm can be set.
11. **R103** is a control that allows you to calibrate the internal oscillator to the frequency of the power line.
12. **DECIMAL POINT AM INDICATOR** - Lights only when time or alarm is being set. TIME switch on case back MUST be in 12 HOUR position.
13. **TIME Switch** — Allows the time to be displayed in 12-hour or 24-hour time.
14. **TOUCH PLATE** — When touched after the alarm has started to sound, the alarm will reset to sound again in approximately seven minutes when the Clock is in the SNOOZE mode. When operating in the NORMAL mode, the Clock will reset to sound again in 24 hours. Operates in either 12-hour or 24-hour time.
15. **ALARM Switch** — The alarm will sound at the set time when the switch is in ON position. With the switch in the OFF position, the alarm is inoperative. NOTE: This switch may also be used to perform the same function as the TOUCH PLATE.



PICTORIAL 5-5

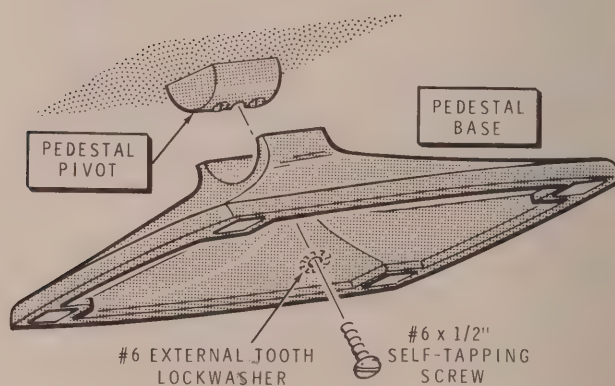


Detail 5-5A

INSTALLING PEDESTAL BASE

Refer to Pictorial 5-5 for the following steps.

- () Refer to Detail 5-5A and secure the pedestal pivot on the bottom of the Clock with two #4 x 3/4" self-tapping screws.
- () Remove the paper backing from the remaining four plastic feet. Then firmly press the feet onto the bottom surface at each corner of the pedestal base.



Detail 5-5B

- () Refer to Detail 5-5B and mount the pedestal base to the pedestal pivot. Use a #6 x 1/2" self-tapping screw and #6 external tooth lockwasher.

This completes the assembly of your Clock.

IN CASE OF DIFFICULTY

This section of the Manual is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your Clock is assembled.

The second part, titled "Troubleshooting Chart," is provided to assist you in servicing the Clock if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after your Clock has been in use for some time. The "Troubleshooting Chart" lists a number of possible difficulties that could arise along with several possible solutions to those difficulties.

Try to analyze the symptoms of any problem you might have before starting any troubleshooting procedure. This can usually be accomplished by trying the various functions of your Clock to determine abnormal operations. A review of the "Operation" section may help your analysis.

NOTE: Refer to the Circuit Board X-Ray Views on Pages 61 and 62 for the physical location of parts on the circuit boards.

GENERAL TROUBLESHOOTING INFORMATION

1. Check all the wires that are connected between the two circuit boards and between the circuit boards and other parts. Trace each wire in colored pencil on the Pictorial as it is checked. Make sure these wires are connected to the proper points and are properly soldered. Someone who is not familiar with the unit may notice something you have consistently overlooked.
2. Be sure the IC's are seated properly in their sockets.
3. About 90% of the kits that are returned for repair do not function properly because of poor connections and soldering. Therefore, many troubles can be located by a careful inspection of connections to make sure they are soldered as described in the "Soldering" section of the "Kit Builders Guide." Reheat any doubtful connections.
4. Closely examine each circuit board foil in a good light to see that no solder bridges exist between adjacent connections. If available, a magnifying glass would be helpful for this purpose. Remove any solder bridges by holding a clean, hot soldering iron tip between the two points that are bridged until the excess solder flows down onto the tip. Compare your foil pattern against the X-Ray Views on Pages 61 and 62.

5. Be sure each transistor is in its proper location (correct part number and/or type number). Be sure that each transistor lead is in the right hole and has a good solder connection to the foil.
6. Check the integrated circuits for proper positioning. (Be sure the dot or notched end of each IC is over the half dot printed on the circuit board.)
7. Check each capacitor value. Be sure that a capacitor of correct value is installed at each capacitor location. Check each electrolytic capacitor to be sure the lead near the positive (+) marking is at the correct position.
8. Check each resistor value carefully. It would be easy, for example, to install a 2200 Ω (red-red-red) resistor where a 22 k Ω (red-red-orange) resistor is called for. A resistor that is discolored, or cracked, or shows any sign of bulging would indicate that it is damaged and should be replaced. Since damaged resistors are often the result of some other difficulty (such as faulty wiring), you should try to find out what caused the damage before you replace the part.
9. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.
10. Check all component leads connected to the circuit boards. Make sure the leads do not extend through the circuit board and come in contact with other connections or parts.

If you still cannot locate and correct the trouble after the above tests are completed, and if a voltmeter is available, check your Clock's voltages against the voltages shown on the Schematic Diagram (fold-out from Page 65) and in the "Voltage Charts" (Pages 63 and 64).

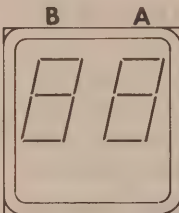
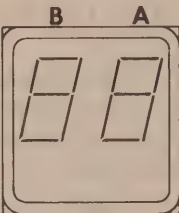
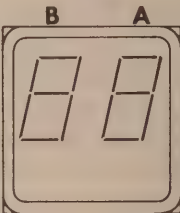
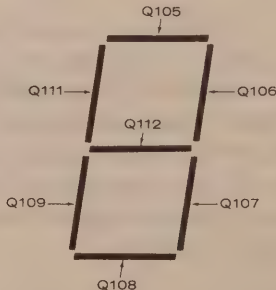
NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the back cover of this Manual. Your Warranty is located inside the front cover of this Manual.

WARNING: Hazardous voltages are exposed in the Clock when the case top is removed and the power cord is plugged into the AC outlet. See "Chassis Photograph" on Page 66.

Troubleshooting Chart

This chart lists the Condition and Possible Cause of several malfunctions. If a particular part or parts are mentioned (Q107 for example) as a Possible Cause, check that part to be sure it was installed and wired correctly. It is also possible for a part to be faulty and require replacement.

CAUTION: When you perform some of the following steps, the main circuit board may have to be removed from its mounting posts. During this time, if you have the power cord plugged into an AC outlet, be extremely careful so the cases or leads of the electrolytic capacitors on the foil side of the circuit board do not contact the frames of any of the clock switches. A short circuit between them at this time could permanently damage the solid state devices in your Clock.

CONDITION	POSSIBLE CAUSE
None of the digits light.	<ol style="list-style-type: none"> 1. Fuse (F301). 2. D201, D202, D204, D205, D206, D207, D208, D209, and D216. 3. Q103, Q104, Q207. 4. R217. 5. C208. 6. T301.
One digit does not light or does not light properly.	<ol style="list-style-type: none"> 1. Associated components. <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>V101</p>  </div> <div style="text-align: center;"> <p>V102</p>  </div> <div style="text-align: center;"> <p>V103</p>  </div> </div> 2. V101B - Q208, Q209, D223. V101A - Q211, Q212, D222. V102B - Q213, Q214, D221. V102A - Q215, Q216, D219. V103B - Q217, Q218, D218. V103A - Q219, Q221, D217. 3. Connections at pins 3 through 8 of IC201. 4. Connections to anodes of associated display tube, V101 through V103.
<p>Digit or segment does not light.</p> <p>Common segment of each digit remains on or off.</p> <p>One segment lights up much brighter than others.</p>	<ol style="list-style-type: none"> 1. Related transistor. 

CONDITION	POSSIBLE CAUSE
Only one digit turns on or steps across display visibly.	<ol style="list-style-type: none"> 1. R217. 2. C208. 3. IC201.
Display remains all eights when placed into TIME SET.	<ol style="list-style-type: none"> 1. D224, and D228. 2. Q206. 3. IC201. 4. SW301, SW302, SW308.
Fails to display 24-hour time or 12-hour time.	<ol style="list-style-type: none"> 1. D225. 2. SW307.
Hours will not advance.	<ol style="list-style-type: none"> 1. D226. 2. IC201. 3. SW303.
Minutes will not advance.	<ol style="list-style-type: none"> 1. D227. 2. IC201. 3. SW303.
Clock does not count.	<ol style="list-style-type: none"> 1. Q206. 2. SW308.
Alarm does not sound, or no snooze function or no reset function.	<ol style="list-style-type: none"> 1. Q222, Q223, and Q224. 2. Speaker. 3. D225, D228, D229, and D231. 4. SW305, SW306, and SW307. 5. IC102.
Displays are always dim or bright.	<ol style="list-style-type: none"> 1. Q102, Q207, Q103, Q104. 2. SW305. 3. LDR101.
With R103 counterclockwise and NORMAL switch in CAL position, Displays do not cycle bright and dim.	<ol style="list-style-type: none"> 1. Q101, Q205. 2. IC101. 3. SW308. 4. See Condition and Causes immediately above.
Display goes to all eights when you disconnect line cord.	<ol style="list-style-type: none"> 1. Batteries. 2. Q201, Q202, Q203, Q204. 3. D212 (if batteries other than nickel-cadmium are used), D213, D214, D215. 4. SW308.

CONDITION	POSSIBLE CAUSE
Oscillator will not adjust to slow and stop display brightness pulsations as described in adjustment section.	<ol style="list-style-type: none"> 1. IC101. 2. R101, R102, R103, R104. 3. C101, C105.
Off digits are faintly lighted. (Off segment glow.)	<ol style="list-style-type: none"> 1. D204. 2. R138 through R144.
Off segments are faintly lighted. (Off segment glow.)	<ol style="list-style-type: none"> 1. V101, V102, V103 pin connectors. 2. Shorted foil.
Faintly superimposed number is stepping across display (ghosting).	<ol style="list-style-type: none"> 1. Q207, Q103, Q104. 2. D217, D218, D219, D221, D222, D223.
Digits flicker.	<ol style="list-style-type: none"> 1. Remove IC201 and see if keep-alive cathodes are lit. If not; <ol style="list-style-type: none"> A. D203. B. R132 through R137. <div data-bbox="914 1030 1122 1266" data-label="Diagram"> </div> <p data-bbox="914 1266 1122 1292">KEEP ALIVE CATHODES</p>

SPECIFICATIONS

Display	Six full digits.
Format	12- or 24-hour time.
Line Operational Accuracy	Determined by accuracy of power line frequency. No accumulative error.
Battery Operational Accuracy	Accuracy depends on the initial calibration, battery discharge curve, and temperature. Clock will lose or gain less than 30 seconds per hour. NOTE: This applies only when Clock is battery operated.
Alarm	Repetitive tone. If not manually shut off, it will sound for approximately 1 hour. It will then shut off automatically and sound again in 23 hours.
Snooze Alarm	Interrupted in 7-minute intervals. Will continue to repeat for one hour. It will then shut off and sound again in 23 hours.
Touch Plate Control	Resets alarm for 24 hours, or resets snooze alarm for seven minutes.
Power Consumption	GC-1092A: 120 volts, 60 Hz, approximately 7 watts. GC-1092AE: 120-240 volts, 50/60 Hz, approximately 7 watts.
Dimensions	8-3/8" wide x 4-7/8" deep x 2-1/2" high. (4" high when mounted on pedestal.)
Weight	3 lbs.

The Heath Company reserves the right to discontinue products and to change the specifications at any time without incurring any obligation to incorporate new features in products previously sold.

CIRCUIT FUNDAMENTALS

The following paragraphs will provide you with a better understanding of the circuit relationships in your Clock and describe how the circuits work together. Refer to the Schematic Diagram (fold-out from Page 65) while you read the following paragraphs.

All the time-keeping digital logic is performed by IC201. The remaining circuitry supplies DC power, responds to the commands from IC201 to drive the display tubes, and controls the display brightness. The Clock uses battery power to produce a DC source voltage and a 60 Hz reference signal to keep the Clock on time during a power failure or when you move the Clock from one location to another.

A 60 Hz reference signal, taken from the low-voltage secondary winding of transformer T301, or from 60 Hz oscillator IC101, is applied to pin 23 of IC201. The time information is then multiplexed to the six digits of the display. Transistor Q206 changes the 60 Hz sine wave into a 60 Hz square wave.

R217 and C208 are the timing components for the multiplexing oscillator in IC201. The oscillator in IC201 applies a positive driving pulse first to pin 3, then pin 4, then pin 5, etc., (through pin 8) in rapid succession. This continuing scanning switches high voltage to the anodes of the appropriate display tubes. The resulting pulses that appear at pins 9 through 15 of IC201 determine which of the seven segments of each display will light.

The multiplexing is so fast that the display digits appear to light at the same time.

As an example, consider the time 5:43:21.

When a positive pulse appears at pin 3 of IC201, transistors Q219 and Q221 turn on and place 204 volts on the anode of V103A. At the same time, positive pulses appear at pins 13 and 14 of IC201. These pulses turn on transistors Q106 and Q107 (which act as controlled current sinks) and light segments b and c of V103A which causes a 1 to be displayed. The remaining segments of V103A, and the segments of V102A and B, and V101A and B do not light because insufficient high voltage is applied to their respective anodes.

A positive pulse next appears at pin 4 of IC201 and turns on transistors Q217 and Q218, and places 204 volts on the anode of V103B. The positive pulses also appearing at pins 9, 11, 12, 14, and 15 of IC201, turn on transistors Q112, Q109, Q108, Q106, and Q105 and light segments a, b, d, e, and g respectively; this causes a 2 to be displayed by V103B. This multiplexing procedure continues until all appropriate digits light. Then the sequencing starts over. For 12-hour time, either five or six digits will light. For 24-hour time, six digits will always light.

Diodes D217, D218, D219, D221, D222, and D223 act as a 6-input OR gate and provide a train of pulses from IC201. The leading edges of these positive pulses trigger the monostable multivibrator that consists of transistors Q207, Q102, and Q103. The pulse width of this monostable is controlled by light dependent resistor LDR101 but can never exceed the width of the pulse from IC201. The output of the monostable turns on transistor Q104 which grounds controlled current sink transistors Q105, Q106, Q107, Q108, Q109, Q111, and Q112. The brightness of the room, as detected by LDR101, controls the duty cycle of the monostable which in turn controls the light intensity of the display tubes.

TIME

IC201 uses a scanning technique to sense the control switch programming of switches SW301 through SW308, and touch controlled monostable IC102. Using this method, only two connections (to IC201 pins 21 and 22 respectively) are required to sense the switching matrix commands. Diodes D224, D225, D226, D227, D228, D229, and D231 isolate the controlling multiplex signals of IC201 from influencing other switch matrix circuit functions.

When switches SW301 through SW306 are in their normal positions (toward the case front), the time will count and be continuously displayed. When SW301 is in the Set position, the multiplex pulses at pin 8 of IC201 are applied through D224, SW302, and SW301 to pin 22 of IC201. This stops the counters and resets the seconds display to zero. From an initial all-eights-condition, the hours display will be reset to 12 for 12-hour time or to 00 for 24-hour time. In the 12-hour time mode, the AM indicator will be lighted only during the AM portion of the time count. In the 24-hour time mode, the AM indicator will not light.

When SW303 is held in the Advance position, the pulses at pin 7 of IC201 are applied through D226 and SW303, and are also applied to pin 22 of IC201 which advances the hours display of V101A and V101B. With SW303 and SW304 simultaneously placed in their Advance positions, this applies the pulses from pin 7 of IC201 simultaneously to pins 21 and 22 of IC201 which advances the tens-of-minutes display of V102B. If only SW304 is in the Advance position, this applies the pulses from pin 7 of IC201 through D227 and SW304 to pin 21 of IC201 and advances the minutes display of V102A.

ALARM

When SW302 is placed in the Set position, the multiplex pulses at pin 8 of IC201 are applied through D224 and SW302 to pin 21 of IC201. This will display the contents of the alarm counter memory with the triangular decimal of V103A lighted for 12-hour time, if the alarm is set for the AM portion of the day. For 24-hour time, the decimal will not light. The time will continue to count uninterrupted but will not be shown by the display tubes.

NOTE: The following paragraphs describe the alarm circuitry with alarm switch SW307 in the On position.

With touch control switch SW305 in the Alarm Reset position, multiplexed pulses from pin 6 of IC201 are coupled through D228, D229, Q223, D232, SW307, and SW305 to pin 21 of IC201. At the alarm set time, a burst of pulses appear at pin 20 of IC201 that turns on Q224 and allows speaker SP301 to sound a repetitive alarm. If not turned off, the alarm will sound for an hour. Placing alarm switch SW307 in the off and then back in the on position, placing touch control switch SW305 in the Snooze position, or hand touching the Touchplate on top of the case resets the alarm to sound again in 24 hours.

With touch control switch SW305 in the Snooze position, multiplexed pulses from pin 6 of IC201 are coupled through D228, SW307, and SW305 to pin 21 of IC201, which enables the alarm. A touchplate command will now turn on Q222 which applies multiplexed pulses through SW305 to pin 22 of IC201 and starts a seven-minute interruption of the alarm.

Switch SW308 selects either 12- or 24-hour time. With SW308 in the 24-hour position, the multiplexed pulses at pin 5 of IC201 are applied through D225 and SW308 to pin 22 of IC201 which programs IC201 to display 24-hour time.

When SW301 or SW302 are in their Time Set or Alarm Set positions, an AM time signal from Pin 16 of IC201 is applied through R251, SW308, and SW301 or SW302, to the base of Q113 and turns it on. Current flow through Q113 causes the decimal point of V103A to light. Note that this occurs only on the AM portion of a 12-hour time display and only in the time or alarm set positions.

VOLTAGE SOURCES

NOTE: The Model GC-1092A Clock uses a power transformer which only operates from a 120-volt, 60 Hz power source. The Model GC-1092AE Clock uses a transformer which will operate from a 120-240 volt, 50/60 Hz power source. Circuit wise, both transformers are designated as T301. Two secondary windings (one high voltage and one low voltage) supply the voltages required by the Clock.

HIGH VOLTAGE SUPPLIES

Diodes D201 and D202 form a full-wave high voltage rectifier. Capacitor C201, resistor R201, and zener diodes D204, D205, and D206 filters and regulates this positive voltage to provide a regulated +204 and +136 volts for the display tubes. Diode D203 forms a half-wave, high-voltage rectifier. Capacitor C202 filters this negative (-264) voltage which keeps the neon display tubes ionized during interdigit blanking periods.

LOW VOLTAGE SUPPLY

Diodes D207 and D208 form a full-wave, low-voltage rectifier. Capacitor C203 filters this positive voltage while resistor R202 and zener diode D209 maintain the proper voltage (+16.1V) required by the interfacing circuitry. Resistor R203 and diode D211 provide saturation current through Q201, and also a trickle charging current when rechargeable batteries are used in the Clock. Diode D212 blocks the trickle charge current if nonrechargeable batteries are used.

Resistors R208 and R209 form a voltage divider which turns Q204 on as long as power line voltage is present. Transistor Q204 keeps the DC converter circuit turned off by keeping Q202 biased off.

Resistors R212 and R213 form a voltage divider that keeps Q205 biased off. This keeps a voltage from being applied to the temporary 60 Hz oscillator, IC101, so that it will not oscillate during normal power line operation.

OPERATION DURING AC POWER INTERRUPTION

When AC power is interrupted, Q204 turns off and allows the astable multivibrator, Q201 and Q202, to oscillate. Current is switched through Q203 and L201 at a frequency necessary to multiply the battery voltage to the value required by IC201. Diode D215 acts as a half-wave rectifier while capacitor C207 filters the voltage which is applied to IC201. Diode D216 isolates this voltage from other circuitry to minimize power drain from the batteries.

Diode D214 and capacitor C206 form a half-wave rectifier and filter circuit. This voltage, which is held at approximately 12 volts by zener diode D213, is coupled back to the astable multivibrator. This feedback adjusts the oscillator to the frequency required to maintain the desired voltage multiplication of this DC-to-DC converter circuit.

When transistor Q205 turns on, voltage is applied to temporary oscillator IC101. IC101's 50 or 60 Hz output

signal is DC-level shifted by Q101 to the DC level needed by IC201. This circuit keeps the Clock counting during an AC power interruption.

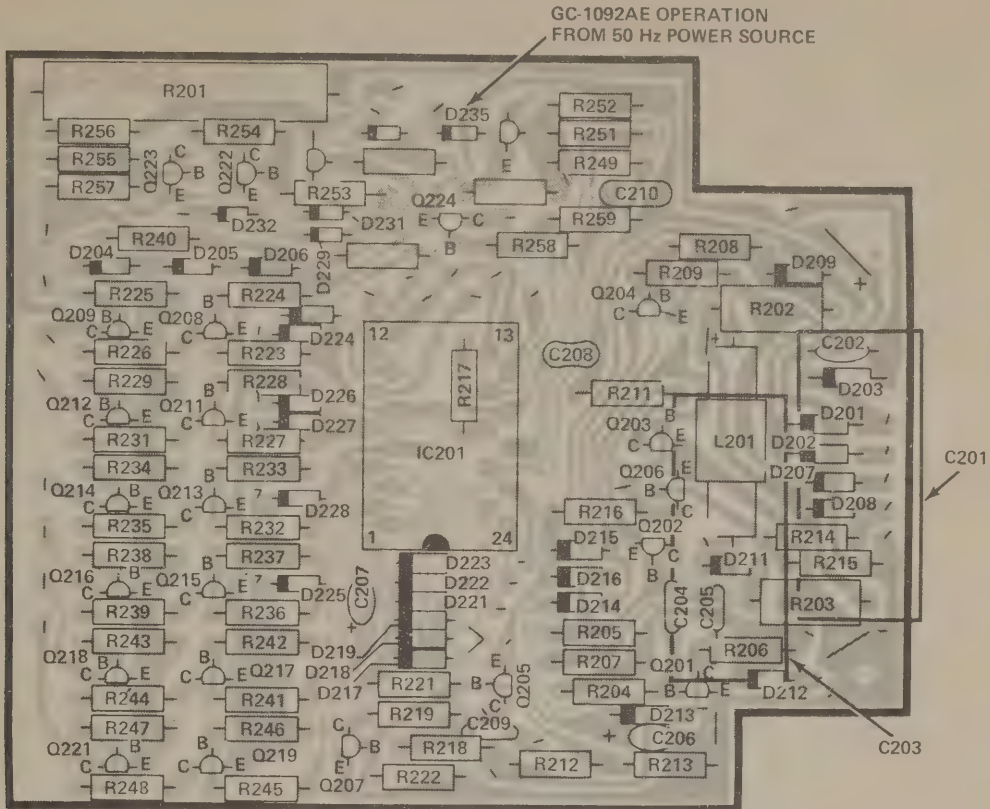
SW306, when switched out of its normal position, performs several functions. It acts as a time-hold switch so you can correctly set the seconds display when you set the Clock, it switches the batteries out of the circuit so you can transport the Clock without discharging the batteries, and it applies voltage to IC101 which causes it to oscillate.

The frequency of internal oscillator IC101 is compared with the power line frequency as follows: The internal oscillator frequency at the output of Q101, and the power line frequency at the output of Q206, are both applied by SW306 to the disabled dimming circuit. The frequency difference will appear as a pulsating change in display tube intensity. Adjusting R103 will change the frequency of internal oscillator IC101. When the pulsations in intensity of the display tube slow and stop, the frequency of internal oscillator IC101 is equal to the power line frequency and the display tubes will light at near constant intensity.

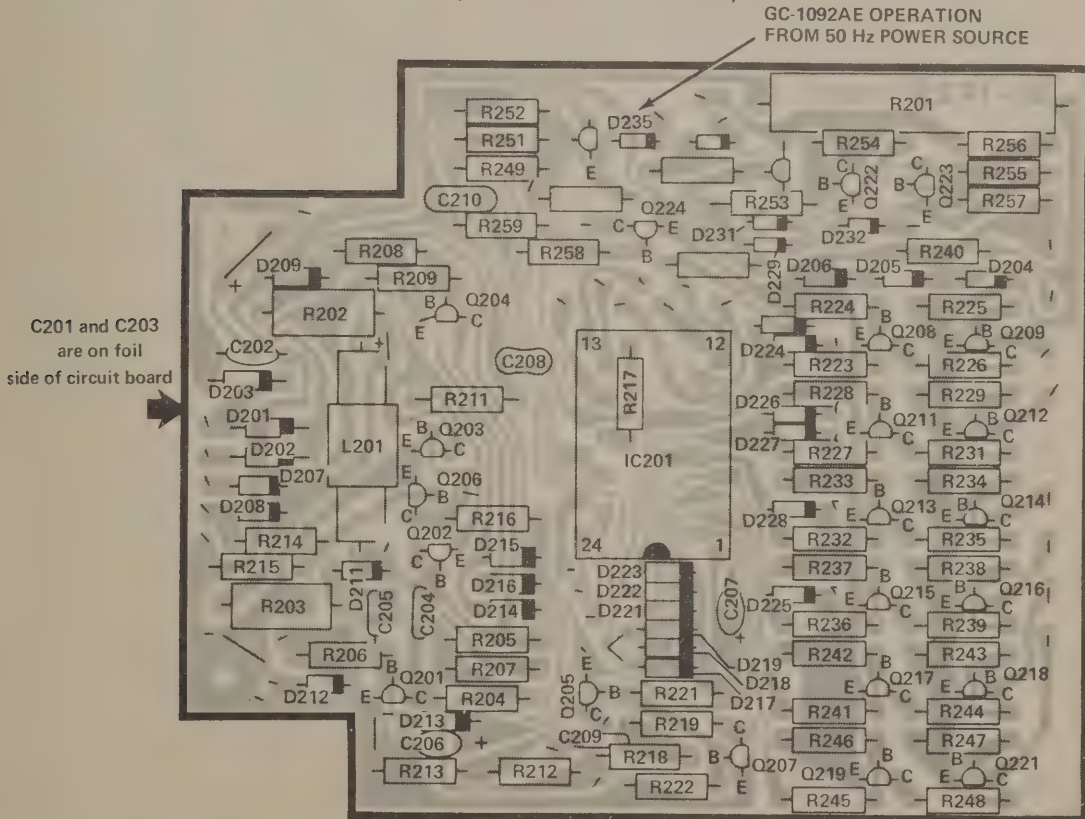
CIRCUIT BOARD X-RAY VIEWS

NOTE: To find the PART NUMBER of a component for the purpose of ordering a replacement part:

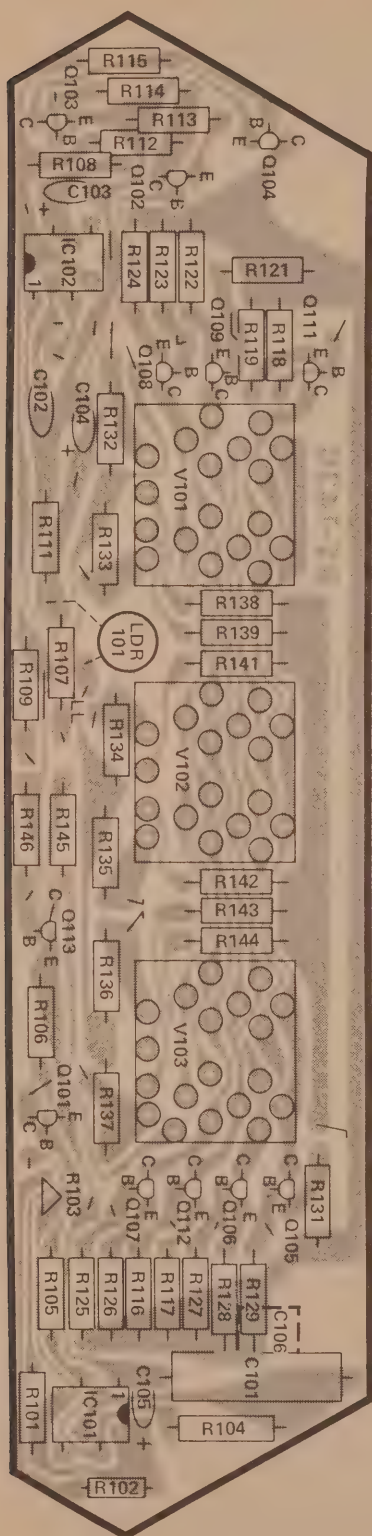
- A. Find the circuit component number (R5, C3, etc.) on the "X-Ray View" or "Chassis Photograph."
- B. Locate this same number in the "Circuit Component Number" column of the "Parts List."
- C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION which must be supplied when you order a replacement part.



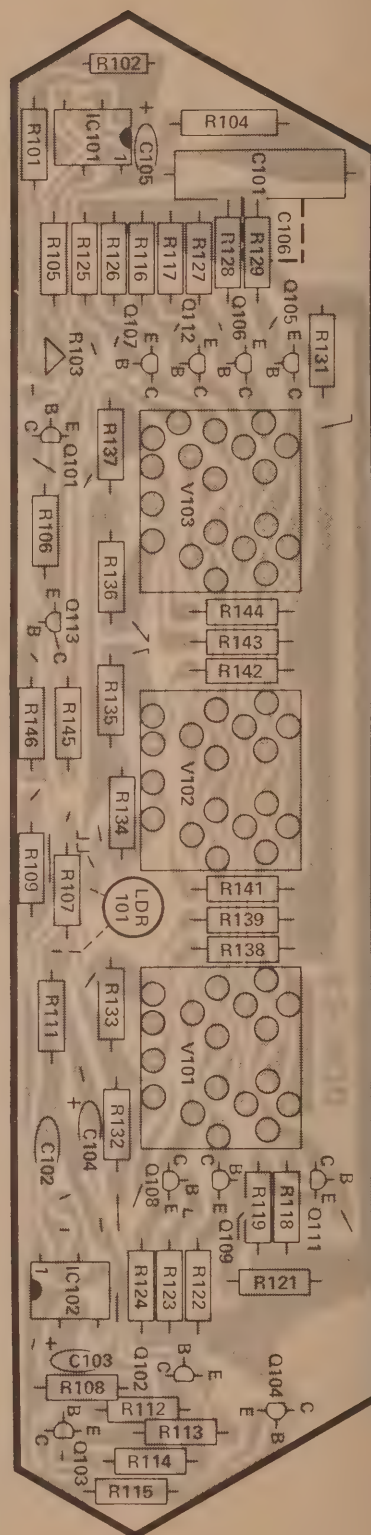
(Viewed from foil side)



(Viewed from component side)

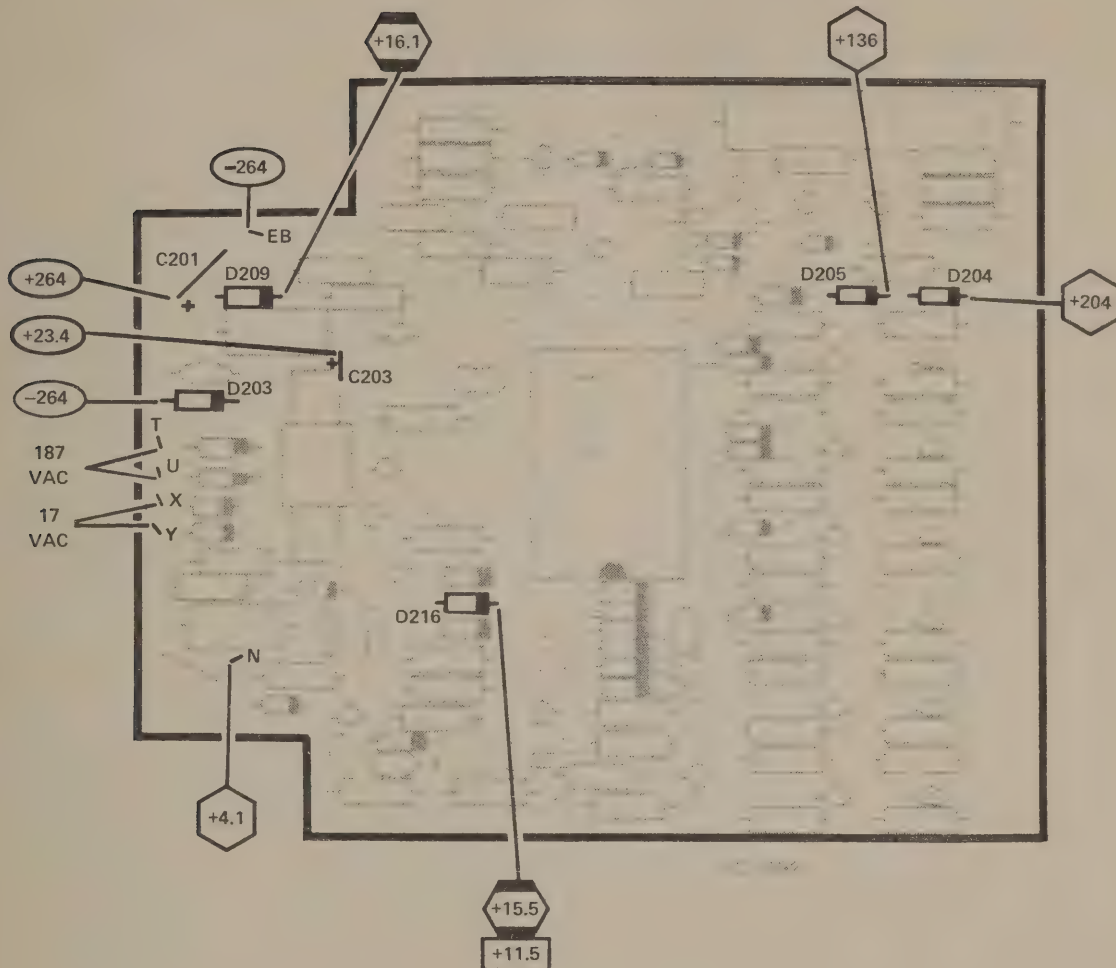


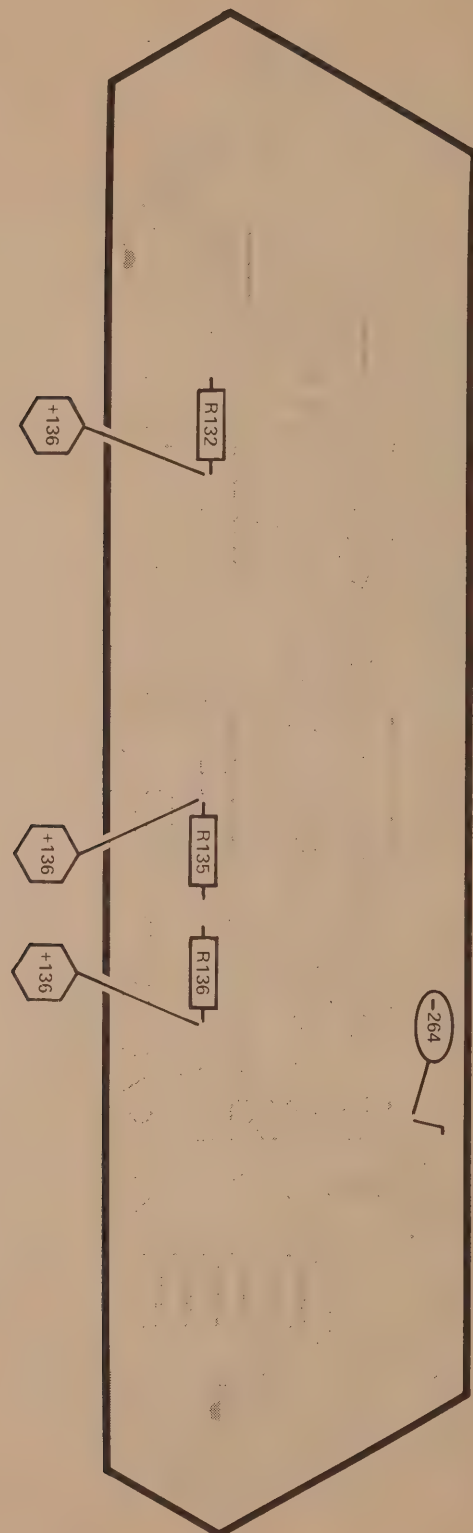
(Viewed from component side)



(Viewed from foil side)

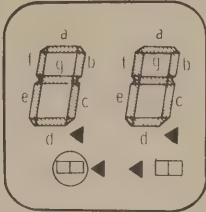
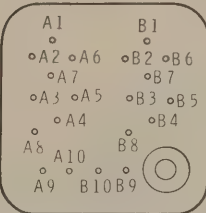


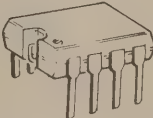
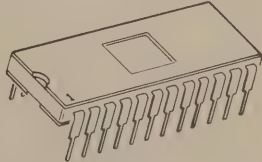



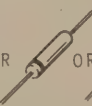

VOLTAGE CHARTS



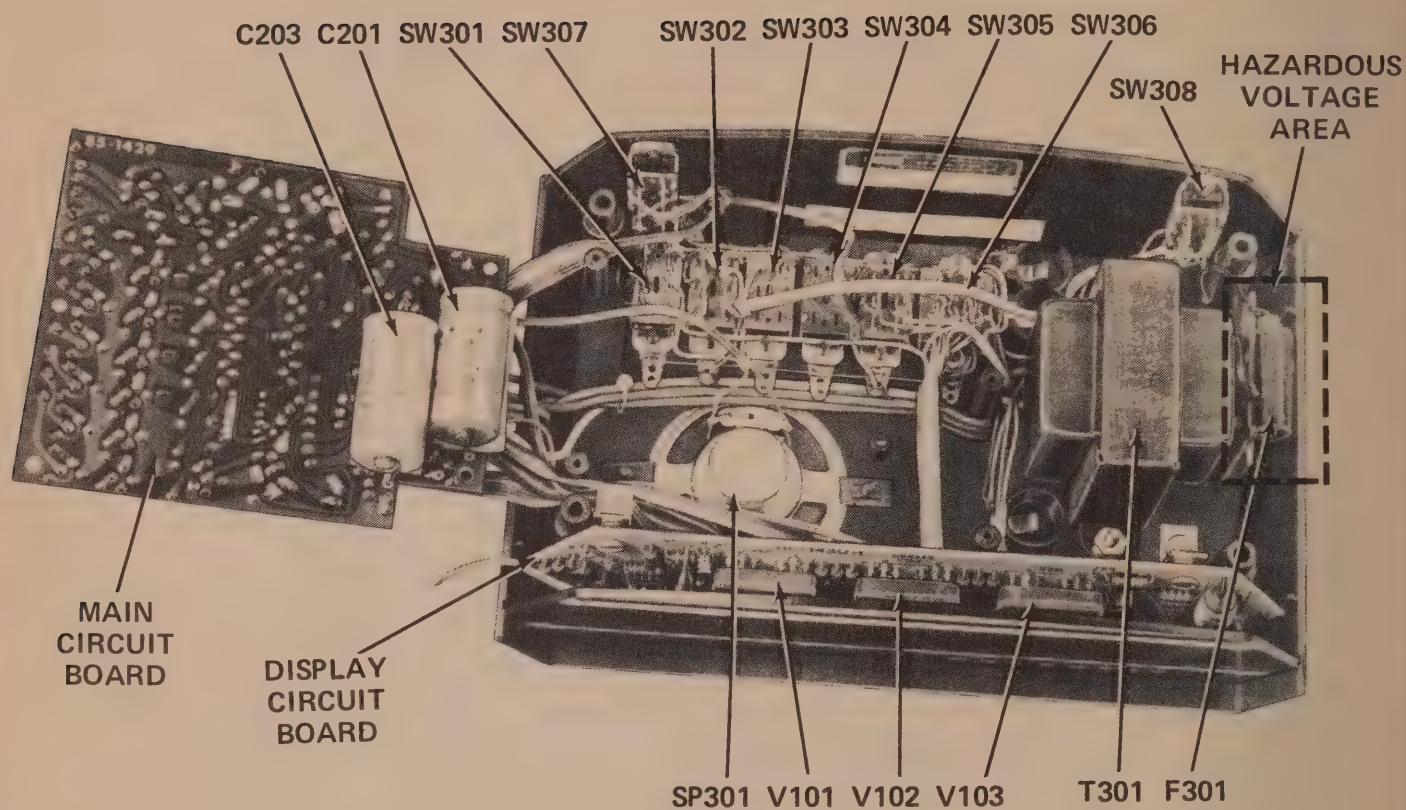


(Viewed from component side)

IDENTIFICATION CHART

COMPONENT	HEATH PART NUMBER	MAY BE REPLACED WITH	IDENTIFICATION																						
V101, V102, V103	411-295	BECKMAN SP-352	<div><div></div><div></div><div><table><tr><th>SEGMENT</th><th>PIN NUMBER</th></tr><tr><td>a</td><td>1</td></tr><tr><td>b</td><td>2</td></tr><tr><td>c</td><td>3</td></tr><tr><td>d</td><td>4</td></tr><tr><td>e</td><td>5</td></tr><tr><td>f</td><td>6</td></tr><tr><td>g</td><td>7</td></tr><tr><td>DECIMAL</td><td>8</td></tr><tr><td>ANODE</td><td>9</td></tr><tr><td>KEEP ALIVE CATHODE</td><td>10</td></tr></table></div></div>	SEGMENT	PIN NUMBER	a	1	b	2	c	3	d	4	e	5	f	6	g	7	DECIMAL	8	ANODE	9	KEEP ALIVE CATHODE	10
SEGMENT	PIN NUMBER																								
a	1																								
b	2																								
c	3																								
d	4																								
e	5																								
f	6																								
g	7																								
DECIMAL	8																								
ANODE	9																								
KEEP ALIVE CATHODE	10																								
Q203	417-233	2N3643	<div><div></div><div>OR</div><div></div></div>																						
Q205, Q223	417-235	2N4121																							
Q105, Q106, Q107, Q108, Q109, Q111, Q112, Q113, Q208, Q211, Q213, Q215, Q217, Q219.	417-294	MPS-A42																							
Q209, Q212, Q214, Q216, Q218, Q221.	417-295	MPS-L51																							
Q101, Q102, Q103, Q104, Q201, Q202, Q204, Q206, Q207, Q222, Q224.	417-801	MPS-A20																							
IC101, IC102	442-53	NE555V																							
IC201	443-687	MK5017AA																							
D209	56-36	VR-16.1G ZENER DIODE	<p>NOTE: HEATH PART NUMBERS ARE STAMPED ON MOST DIODES.</p> <div></div> OR <div></div> OR <div></div> OR <div></div> OR <div></div>																						
D213	56-57	IN716A ZENER DIODE																							
D204, D205, D206	56-68	ZVR-68 ZENER DIODE																							
D214, D215, D216, D217, D218, D219, D221, D222, D223, D224, D225, D226, D227, D228, D229, D231, D232, D235, D301.	56-56	IN4149 DIODE																							

CHASSIS PHOTOGRAPH



EXPEDITED PARTS ORDER FORM (FOR REPAIR PARTS ONLY)				PLEASE DO NOT WRITE IN THIS SPACE				
(1) Give Part Numbers as they are in parts list.				KIT MODEL _____ DATE OF PURCHASE _____ SERIES NUMBER _____				
(2) Include remittance or permission for C.O.D. shipment.		<input type="checkbox"/>	CASH				<input type="checkbox"/>	C.O.D.
(3) Use separate sheet of paper for all correspondence.								
(4) Prices may change to reflect current manufacturing costs.								
(5) Current HEATH account number		AA						
QTY.	PART NUMBER	DESCRIPTION	PRICE	TOTAL PRICE	MARK PROPER SPACE FOR WARRANTY PARTS ONLY			
					3 DAMAGED	2 DEFECTIVE		
HEATH COMPANY BENTON HARBOR MICHIGAN 49022 PHONE 616-983-7381			NAME _____ ADDRESS _____ CITY _____ STATE _____ ZIP _____					

THIS FORM IS FOR U.S. CUSTOMERS ONLY. OVERSEAS CUSTOMERS SEE YOUR DISTRIBUTOR.

- - - - - CUT ALONG DOTTED LINE - - - - -

EXPEDITED PARTS ORDER FORM (FOR REPAIR PARTS ONLY)				PLEASE DO NOT WRITE IN THIS SPACE				
(1) Give Part Numbers as they are in parts list.				KIT MODEL _____ DATE OF PURCHASE _____ SERIES NUMBER _____				
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HEATH COMPANY BENTON HARBOR MICHIGAN 49022 PHONE 616-983-7381			NAME _____ ADDRESS _____ CITY _____ STATE _____ ZIP _____					

THIS FORM IS FOR U.S. CUSTOMERS ONLY. OVERSEAS CUSTOMERS SEE YOUR DISTRIBUTOR.

CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

Replacement parts are maintained specifically to repair Heath products. Parts sales for other reasons will be declined.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. you'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

Please do not send parts for testing, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.

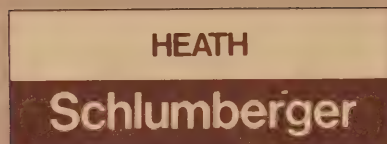
If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least **THREE INCHES** of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022



HEATH COMPANY • BENTON HARBOR, MICHIGAN
THE WORLD'S FINEST ELECTRONIC EQUIPMENT IN KIT FORM

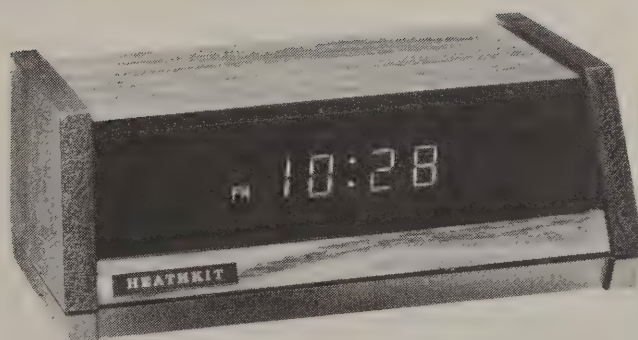
LITHO IN U.S.A.

Heathkit® Manual

for the

DIGITAL ALARM CLOCK Model GC-1107

595-2049-03



HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

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INTRODUCTION

The Heathkit Model GC-1107 Digital Alarm Clock has many attractive features, including a wiring option that lets it display either 12-hour or 24-hour time, an AM-PM alarm with a snooze alarm feature, a 4-digit easy-to-read display, a 50 or 60 Hz wiring option, and a 120-volt or 240-volt power option. The heart of the Clock is an MOS/LSI* integrated circuit that performs all the logic functions of keeping time.

A simple wiring option lets your Clock display either 12-hour or 24-hour time. The clock "knows" the difference between AM and PM and will sound the alarm for the one time, either AM or PM, in 24 hours that you desire. The snooze alarm waits approximately nine minutes each time it is reset until the alarm sounds again.

The blue fluorescent readout tubes clearly display the time on a sloped surface, and the 4-digit display will continue to operate if there is any momentary interruption of AC power. This Clock can be wired to operate from either a 50 Hz or 60 Hz power line, 120 or 240-volts AC.

Attractive, modern styling; small size; and solid-state dependability make this clock ideally suited for your office, your home, or almost anywhere.

Refer to the "Kit Builders Guide" for information on parts identification, tools, wiring, and soldering.

*MOS/LSI-Metal Oxide Semiconductor/Large Scale Integration

PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers in the Parts Pictorial. Any part that is packaged in an individual envelope with the part number on it should be placed back in the envelope after you identify it until it is called for in a step.

CAUTION: The integrated circuits (#443-703 and #443-848) can be damaged by static voltage. Do not handle them until you are told to do so.

To order a replacement part, use the Parts Order Form furnished with this kit. For prices refer to the separate "Heath Parts Price List."

Each circuit part in this kit has its own component number (R2, C4, etc.). Use these numbers when you want to identify the same part in the various sections of the Manual. These numbers, which are especially useful if a part has to be replaced, appear:

- In the Parts List,
- At the beginning of each step where a component is installed,
- In some illustrations,
- In the Schematic,
- In the section at the rear of the Manual.

KEY	HEATH	QTY.	DESCRIPTION	CIRCUIT
No.	Part No.			Comp. No.

RESISTORS

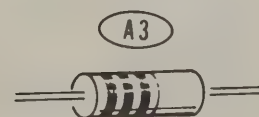
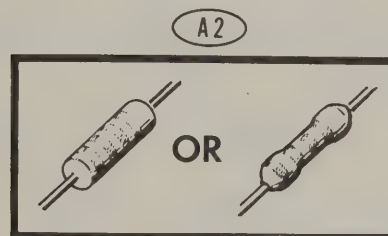
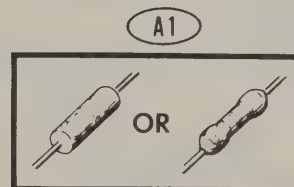
NOTE: The following resistors are 5% tolerance (gold fourth band) unless otherwise noted.

1/4-Watt

A1	6-472-12	1	4700 Ω (yellow-violet-red)	R11
A1	6-682-12	2	6800 Ω (blue-gray-red)	R6, R7
A1	6-103-12	1	10 k Ω (brown-black-orange)	R10
A1	6-273-12	1	27 k Ω (red-violet-orange)	R9
A1	6-473-12	1	47 k Ω (yellow-violet-orange)	R13
A1	6-683-12	1	68 k Ω (blue-gray-orange)	R12
A1	6-104-12	1	100 k Ω (brown-black-yellow)	R4
A1	1-157-12	1	10 M Ω (brown-black-blue)	R3
A1	1-144-12	1	15 M Ω (brown-green-blue)	R2

Other Resistors

A2	6-151	2	150 Ω , 1/2-watt (brown-green-brown)	R1, R8
A3	1-19-1	1	220 Ω , 1-watt (red-red-brown)	R5



KEY	HEATH	QTY.	DESCRIPTION
No.	Part No.		

CIRCUIT
Comp. No.

CAPACITORS

B1	21-143	1	.05 μ F ceramic
B2	25-818	2	500 μ F electrolytic
B3	27-47	1	.1 μ F Mylar*

C4
C1, C2
C3

DIODES

C1	56-56	2	1N4149 diode
C1	56-630	1	1N4748A zener
C1	57-65	2	1N4002 diode

D4, D5
(optional)
ZD2
D1, D3

TRANSISTOR-INTEGRATED CIRCUITS (IC's)

NOTE: Transistors and integrated circuits are marked for identification in one of the following four ways:

1. Part number.
2. Type number. (On integrated circuits this refers only to the numbers; the letters may vary).
3. Part number and type number.
4. Part number with a type number other than the one listed.

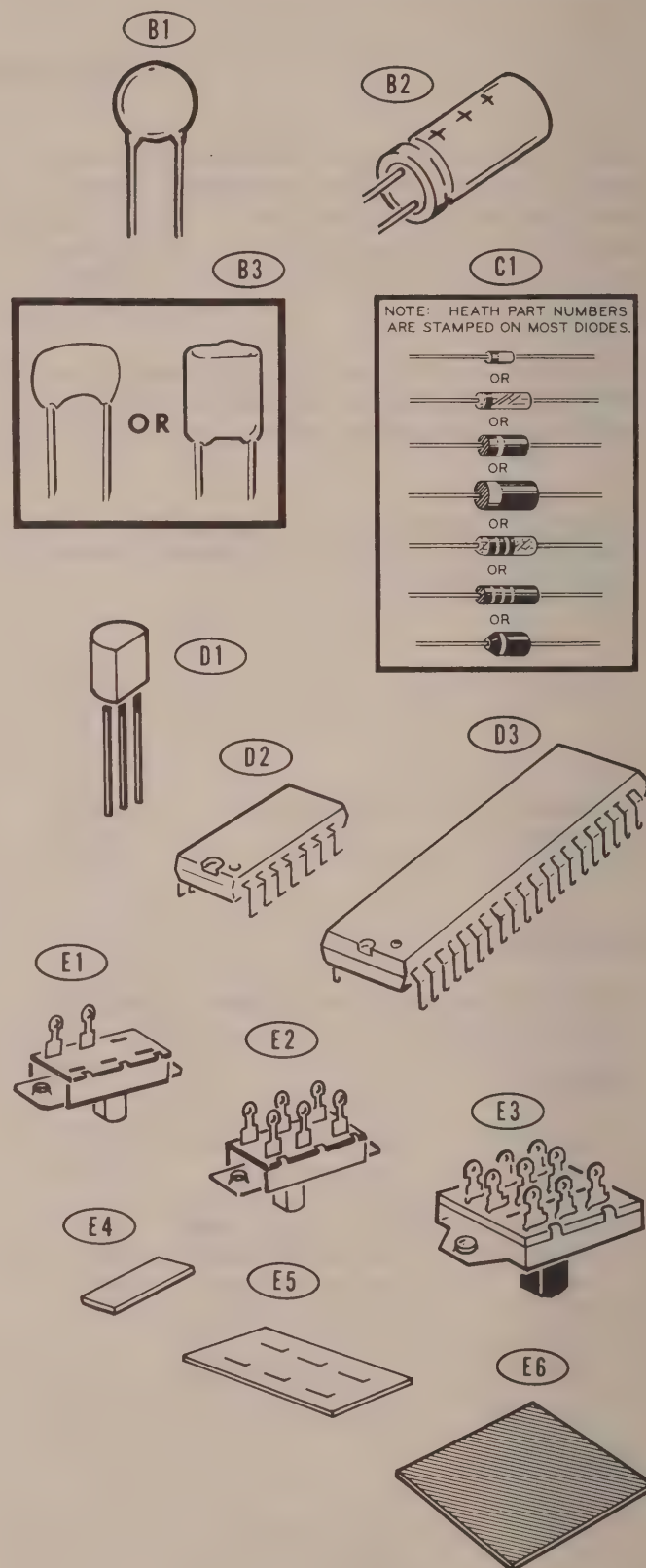
D1	417-801	1	MPSA20 transistor	Q2
D1	417-881	1	MPSA13 transistor	Q1

CAUTION: The integrated circuits (#443-703 and #443-848) can be damaged by static voltage. Do not handle them until you are told to do so.

D2	443-703	1	CD4001 IC	IC2
D3	443-848	1	Clock IC	IC1

SWITCHES-INSULATORS

E1	60-6	3	SPST switch with spring return	SW2, SW4, SW5
E2	60-2	1	DPDT switch	SW3
E3	60-20	1	TPDT switch	SW1
E4	75-138	4	Foot	
E5	75-52	1	Switch insulator	
E6	75-93	1	1" \times 1" insulator paper	



*Registered Trademark, DuPont Corp.

KEY	HEATH	QTY.	DESCRIPTION
No.	Part No.		

CIRCUIT
Comp. No.

PLASTIC PARTS

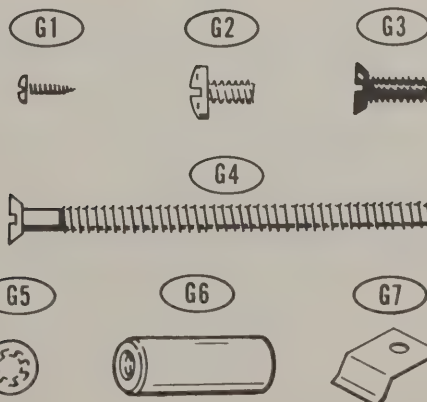
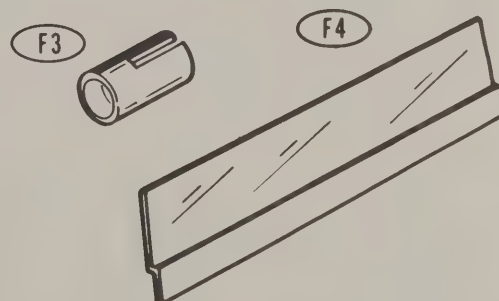
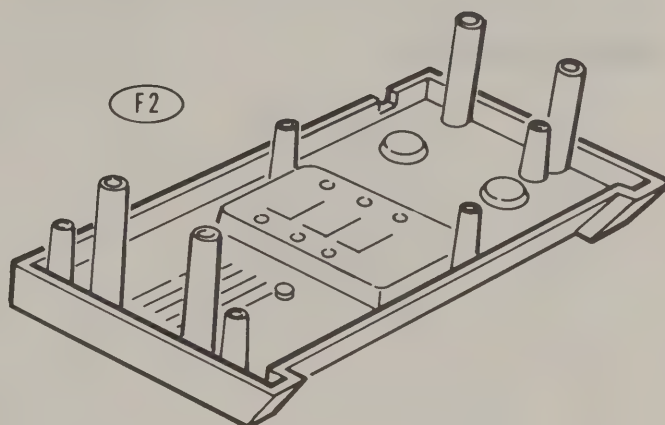
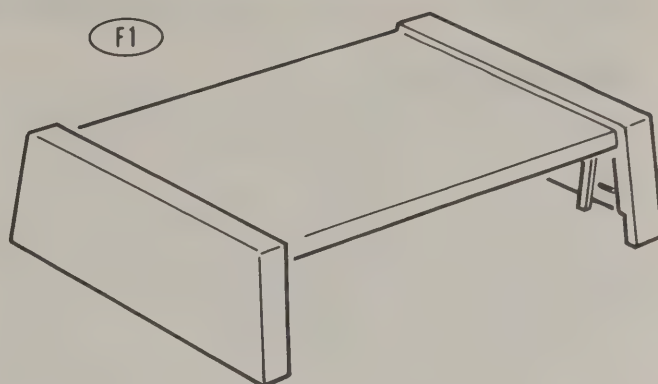
F1	92-77	1	Cabinet top
F2	92-678	1	Cabinet bottom
F3	266-857	1	LDR shield
F4	446-690	1	Readout window

LINE CORD-WIRE-SLEEVING

89-49	1	Line cord
340-2	16"	Bare wire
344-90	7-1/4"	Black wire
344-92	33-1/2"	Red wire
344-93	9-3/4"	Orange wire
344-94	9-3/4"	Yellow wire
344-95	9-3/4"	Green wire
344-96	6"	Blue wire
344-99	5"	White wire
346-67	1/2"	Sleeving

HARDWARE

G1	250-420	6	#2 × 1/4" self-tapping screw
G2	250-235	1	6-32 × 1/4" screw
G3	250-276	10	6-32 × 3/8" black flat head screw
G4	250-1156	4	#6 × 2-1/4" flat head screw
G5	254-1	1	#6 lockwasher
G6	255-83	1	11/16" spacer
G7	258-167	2	Spring clip



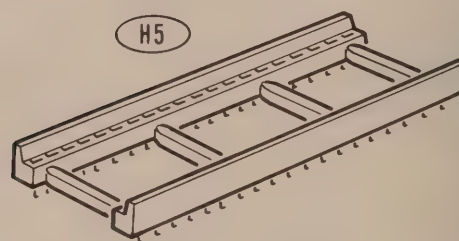
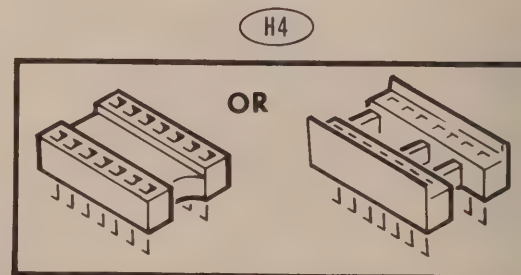
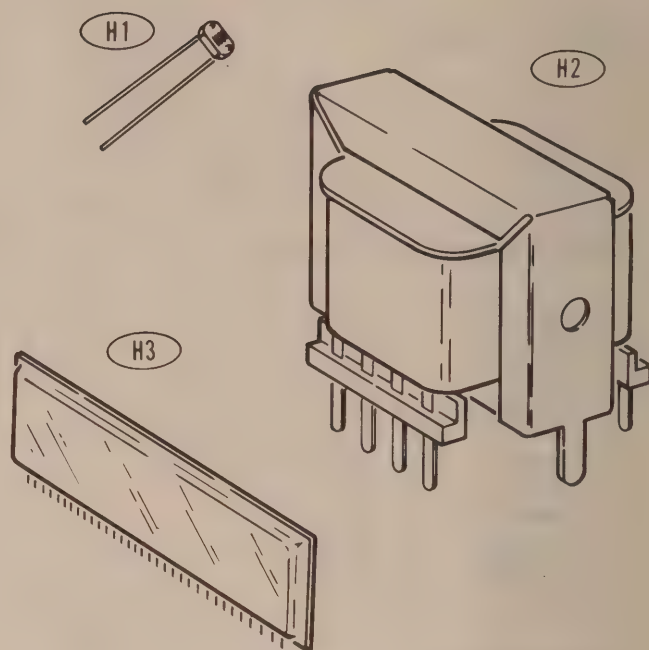
KEY	HEATH	QTY.	DESCRIPTION	CIRCUIT
No.	Part No.			Comp. No.

MISCELLANEOUS

H1	9-67	1	LDR (light dependent resistor)	LDR1
H2	54-949	1	Power transformer	T1
	85-2024-2	1	Printed circuit board	
	401-163	1	Speaker	
H3	411-829	1	4-digit readout tube	
H4	434-298	1	14-pin IC socket	
H5	434-253	1	40-pin IC socket	
			Solder	

PRINTED MATERIAL

390-341	1	"Heathkit" label
390-926	1	"Caution" label
390-995	1	Wood-grain panel (2-piece)
391-34	1	Blue and white label
597-260	1	Parts Order Form
597-308	1	Kit Builders Guide
	1	Assembly Manual (see Page 1 for part number).



STEP-BY-STEP ASSEMBLY

ASSEMBLY NOTES

When you are instructed to mount parts on the printed circuit board, always be sure you have the board positioned as shown in the Pictorial and that each part is the correct one for the step indicated. No special soldering notes will be given for mounting circuit board components; solder each part to the circuit board foil as you install the part on the board. Be especially careful when you solder the integrated circuit sockets and the readout leads to the foil that

you do not create a "solder bridge" to other nearby foils; this would probably cause the Clock not to operate.

When you install parts on the cabinet, do not over-tighten the mounting hardware. Thus, you will avoid stripping the mounting stud holes and cracking the plastic parts. Study each drawing carefully and read each step completely before you perform an operation. Then, be sure each part is mounted exactly in the manner shown before you tighten the mounting hardware.

CIRCUIT BOARD ASSEMBLY

START →

Position the circuit board as shown. Then proceed with the following steps. Solder each lead or pin to the foil as you mount each component on the board and cut off the excess lead lengths.

(✓) R8: 150 Ω , 1/2-watt (brown-green-brown).

(✓) R5: 220 Ω , 1-watt (red-red-brown).

(✓) R6: 6800 Ω (blue-gray-red).

(✓) R7: 6800 Ω (blue-gray-red).

(✓) R9: 27 k Ω (red-violet-orange).

(✓) R10: 10 k Ω (brown-black-orange).

NOTE: When you install an IC socket, be sure that all its pins are straight and through the board before you solder them.

(✓) 14-pin IC socket at IC2.

(✓) 40-pin IC socket at IC1.

(✓) R4: 100 k Ω (brown-black-yellow).

(✓) R11: 4700 Ω (yellow-violet-red).

(✓) R3: 10 M Ω (brown-black-blue).

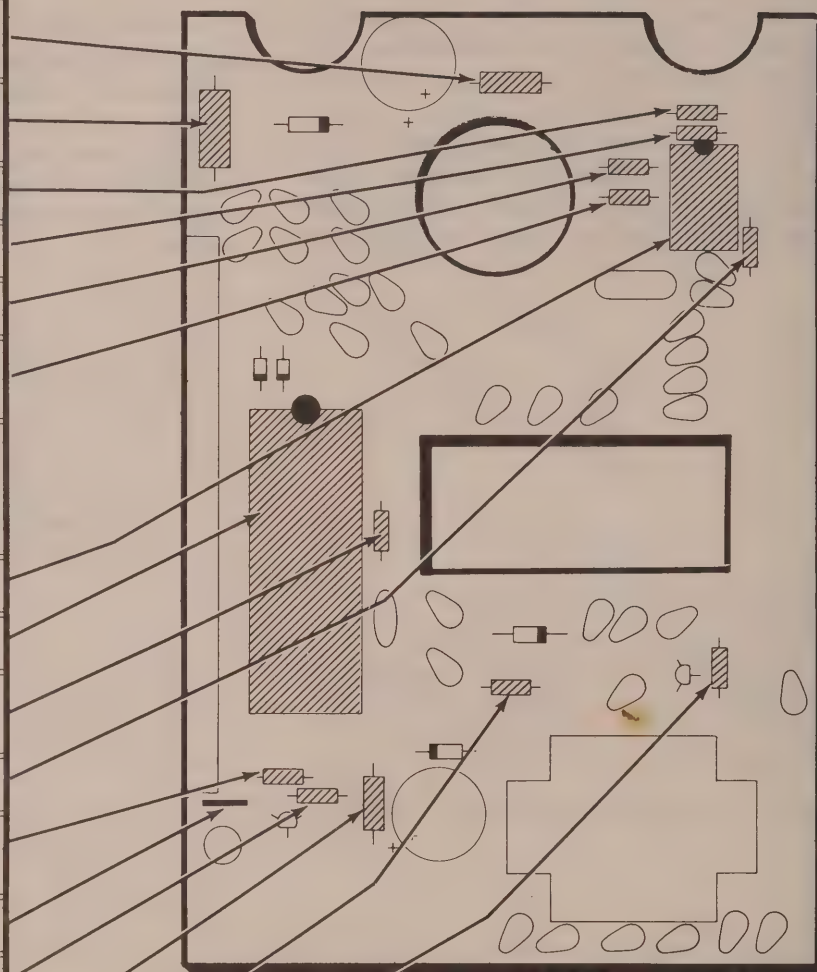
(✓) 3/4" bare wire.

(✓) R2: 15 M Ω (brown-green-blue).

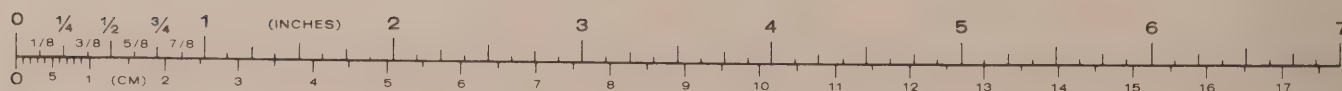
(✓) R1: 150 Ω , 1/2-watt (brown-green-brown).

(✓) R12: 68 k Ω (blue-gray-orange).

(✓) R13: 47 k Ω (yellow-violet-orange).



PICTORIAL 1-1

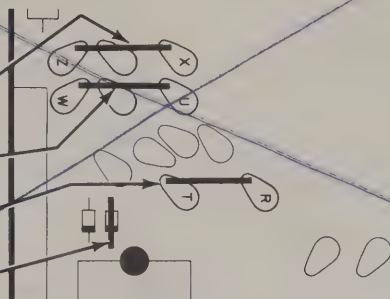


START

IMPORTANT: Perform the next four steps **only** if you desire a 12-hour Clock display; that is, 01:00 to 12:00 and repeat.

- () 1" bare wire at X-Z.
- () 1" bare wire at U-W.
- () 1" bare wire at R-T.
- () 3/4" bare wire at "D4."

12-HOUR DISPLAY



CONTINUE

NOTE: When the 12-hour option is used, nothing will be installed at "D5," nor at holes S, V, Y, AD, AE, and AJ.

PICTORIAL 1-2

START

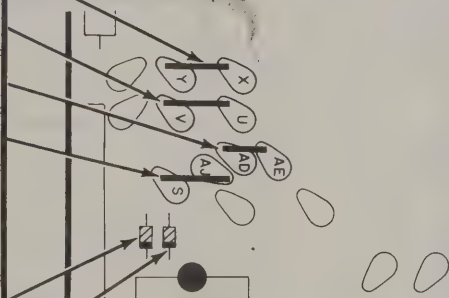
IMPORTANT: Perform the next six steps **only** if you desire a 24-hour display; that is, from 01:00 to 12:00, and then to 13:00, 14:00, etc . . .

- (/) 3/4" bare wire at X-Y.
- (/) 3/4" bare wire at U-V.
- (/) 3/4" bare wire at AE-AD.
- (/) 3/4" bare wire at AJ-S.

NOTE: Refer to right column Detail 1-3A as you install diodes in the following steps.

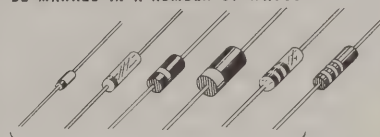
- () D5: 1N4149 diode (#56-56).
- () D4: 1N4149 diode (#56-56).

24-HOUR DISPLAY



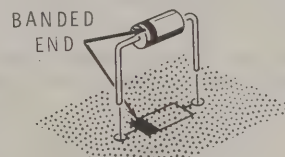
CONTINUE

IMPORTANT: THE BANDED END OF DIODES CAN BE MARKED IN A NUMBER OF WAYS.



BANDED END

NOTE: When you install a diode, always match the banded end of the diode with the band mark on the circuit board.



Detail 1-3A

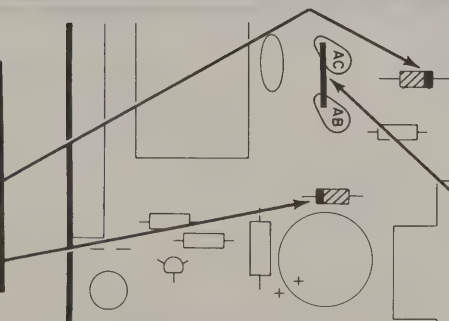
NOTE: Circuit board holes R, T, W, and Z will not be used.

PICTORIAL 1-3

START

Refer to Detail 1-3A (above) as you install diodes in the following steps.

- () ZD2: 1N4748A zener diode (#56-630).
- () D1: 1N4002 diode (#57-65).




CONTINUE

IMPORTANT: Perform the following step **only** if your utility power is 50 Hz AC. Disregard this step if your power is 60 Hz AC.

- () 1" bare wire at AB-AC.

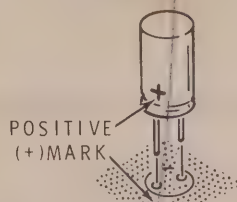
PICTORIAL 1-4

CONTINUE 

START 

() D3: 1N4002 diode (#57-65). Be sure to position the banded end as shown.

NOTE: When you install a vertical electrolytic capacitor, be sure you match the positive (+) mark on the capacitor with the positive (+) mark on the circuit board.

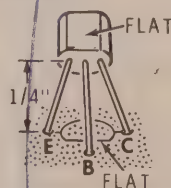


(✓) C2: 500 μ F electrolytic.

(~~/~~) C3: .1 μ F Mylar.

() C4: .05 μ F ceramic.

NOTE: In each of the following steps, where a transistor is installed, line up the flat on the transistor with the flat on the circuit board and insert the transistor leads into the corresponding E, B, and C holes in the circuit board. Solder each transistor as it is installed and cut off the excess lead lengths.

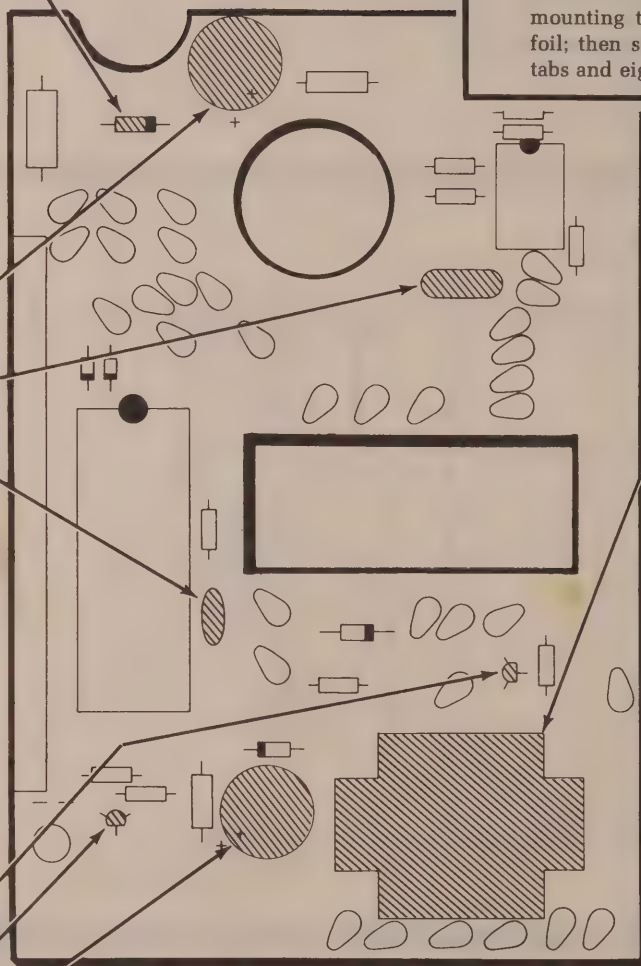


(✓) Q2: MPSA20 (#417-801).

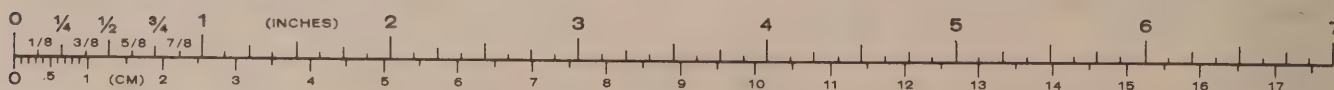
(/) Q1: MPSA13 (#417-881).

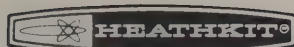
() C1: 500 μ F electrolytic. Be sure to position the positive marks correctly.

() T1: Mount the power transformer as shown. Bend the two mounting tabs down onto the foil; then solder the mounting tabs and eight lugs to the foil.



PICTORIAL 1-5





Refer to Pictorial 1-7 (Illustration Booklet, Page 1) for the following steps.

Position the circuit board as shown in the Pictorial; then proceed with the following steps.

NOTE: To prepare stranded wires, as in the following step, cut each wire to the length indicated and remove 1/4" of insulation from each end. Then tightly twist each bare wire end and add a small amount of solder to hold the fine strands together.

() Prepare the following wires:

5-1/2" red	3-1/2" blue
5-1/2" red	5" white
5" green	4-1/2" yellow
4" green	

Install one end of each wire in a circuit board hole as directed in the following steps. Solder the wire end to the foil and cut off the excess wire. The free wire ends will be connected later.

(✓) 5-1/2" red wire to hole P.

(✓) 5-1/2" red wire to hole Q.

(✓) 5" green wire to hole K.

(✓) 4" green wire to hole L.

(✓) 3-1/2" blue wire to hole AF.

(✓) 5" white wire to hole H.

(✓) 4-1/2" yellow wire to hole G.

() Prepare the following wires:

3-1/2" yellow	3-1/2" black
4-1/2" orange	4-1/2" red
4" orange	4-1/2" red
3" black	

Install these wires on the circuit board as directed in the following steps.

(✓) 3-1/2" yellow wire to hole N.

(✓) 4-1/2" orange wire to hole J.

(✓) 4" orange wire to hole M.

(✓) 3" black wire to hole AK.

(✓) 3-1/2" black wire to hole AH.

() 4-1/2" red wire to hole AG.

(✓) 4-1/2" red wire to hole AA.

Refer to Pictorial 1-8 (Illustration Booklet, Page 1) for the following steps.

() Refer to Part A of Detail 1-8A and push the leads of the LDR all the way into the LDR shield as shown.

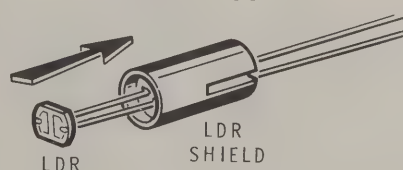
() LDR1: Bend the leads of the LDR in the slots of the LDR as shown in Part B of Detail 1-8A. Then push the leads of the LDR into the circuit board at LDR1 until the LDR shield is 1/4" above the circuit board. Solder the leads to the foil and cut off the excess lead lengths.

(✓) On the top of the circuit board, form the leads of the LDR so the shield and LDR are at an angle of approximately 45 degrees to the surface of the board, as shown in the Pictorial.

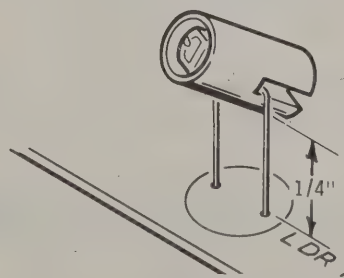
() Cut the bare wire ends from the end of the line cord. Separate the line cord end for a length of 2".

(✓) Cut 1" from each of the line cord wires. Save these 1" wires for the following steps.

PART A



PART B



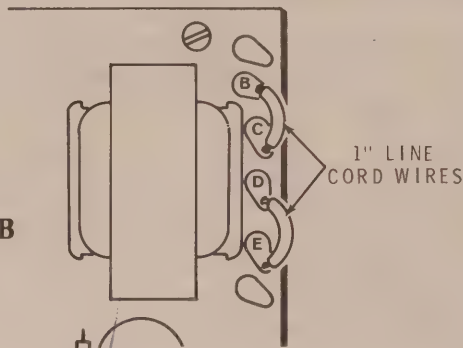
Detail 1-8A

ALTERNATE LINE VOLTAGE WIRING

NOTE: Two sets of line voltage wiring instructions are given below, one for 120 VAC line voltage and the other for 240 VAC line voltage. In the U.S.A., 120 VAC is most often used, while elsewhere 240 VAC is more common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.

120 VAC WIRING

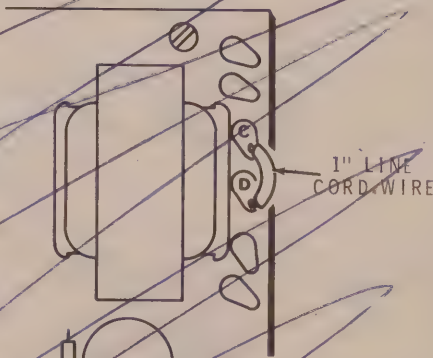
Detail 1-8B



- () Prepare both ends of the two 1" pieces of line cord wire.
- () Refer to Detail 1-8B and install a 1" line cord wire on the circuit board from hole B to hole C. Solder both circuit board foil connections and cut off the excess wire ends.
- () In the same manner, install a 1" line cord wire from hole D to hole E.

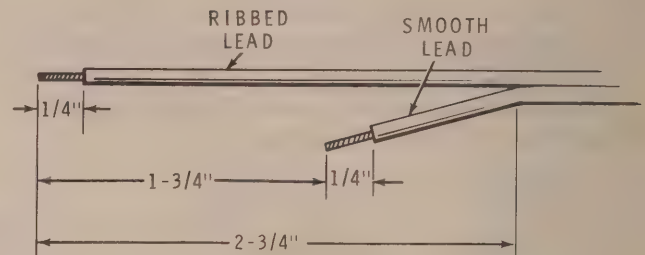
240 VAC WIRING

Detail 1-8C

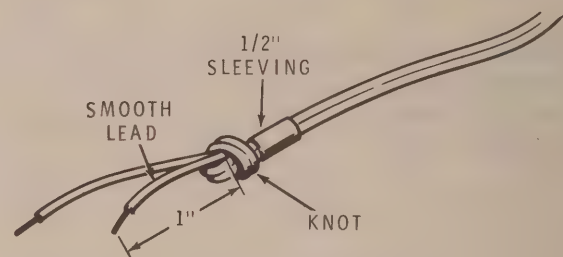


- () Prepare both ends of one 1" piece of line cord wire. You may discard the remaining 1" piece.
- () Refer to Detail 1-8C and install a 1" line cord wire on the circuit board from hole C to hole D. Solder both circuit board foil connections and cut off the excess wire ends.

PART A



PART B



Detail 1-8D

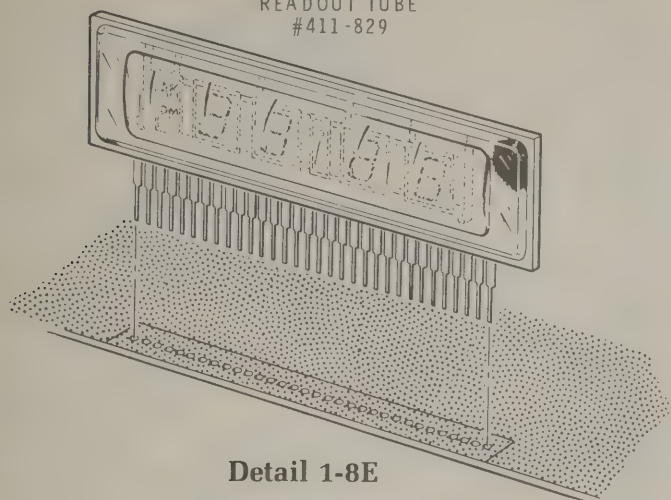
Refer to the inset drawing on Pictorial 1-8 and identify the line cord ribbed and smooth leads.

- () Refer to Part A of Detail 1-8D and cut and prepare the end of the line cord as shown. Tightly twist the bare wire ends and add a small amount of solder to hold the fine strands together.
- () Refer to Part B of Detail 1-8D and slide the 1/2" of sleeving over the ends of the line cord and up onto the cord approximately 4". Tie an over-hand knot in the line cord 1" above the smooth-lead wire end as shown. Slide the sleeving down against the knot.
- () Connect the ribbed lead to circuit board hole F and connect the smooth lead to hole A. Solder both leads to the foil and cut off the excess lead ends.



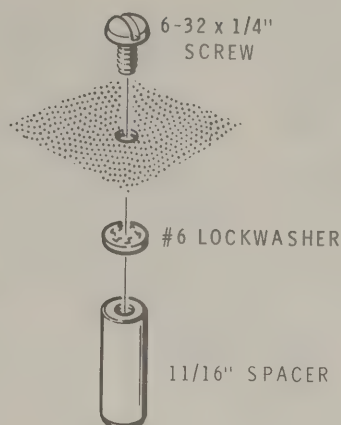


READOUT TUBE
#411-829



Detail 1-8E

- (✓) Locate the 4-digit readout tube (#411-829). Check to be sure all its pins are straight.
- (✓) Refer to Detail 1-8E and mount the readout tube onto the circuit board in the manner shown. Be sure all the pins are through the board and that the tube is fully seated on the component side. Carefully solder the tube pins to the foil and cut off the excess pin ends.



Detail 1-8F

- () Refer to Detail 1-8F and mount a 11/16" spacer on the circuit board at the upper right corner as shown in the Pictorial. Use a 6-32 x 1/4" screw and a #6 lockwasher.

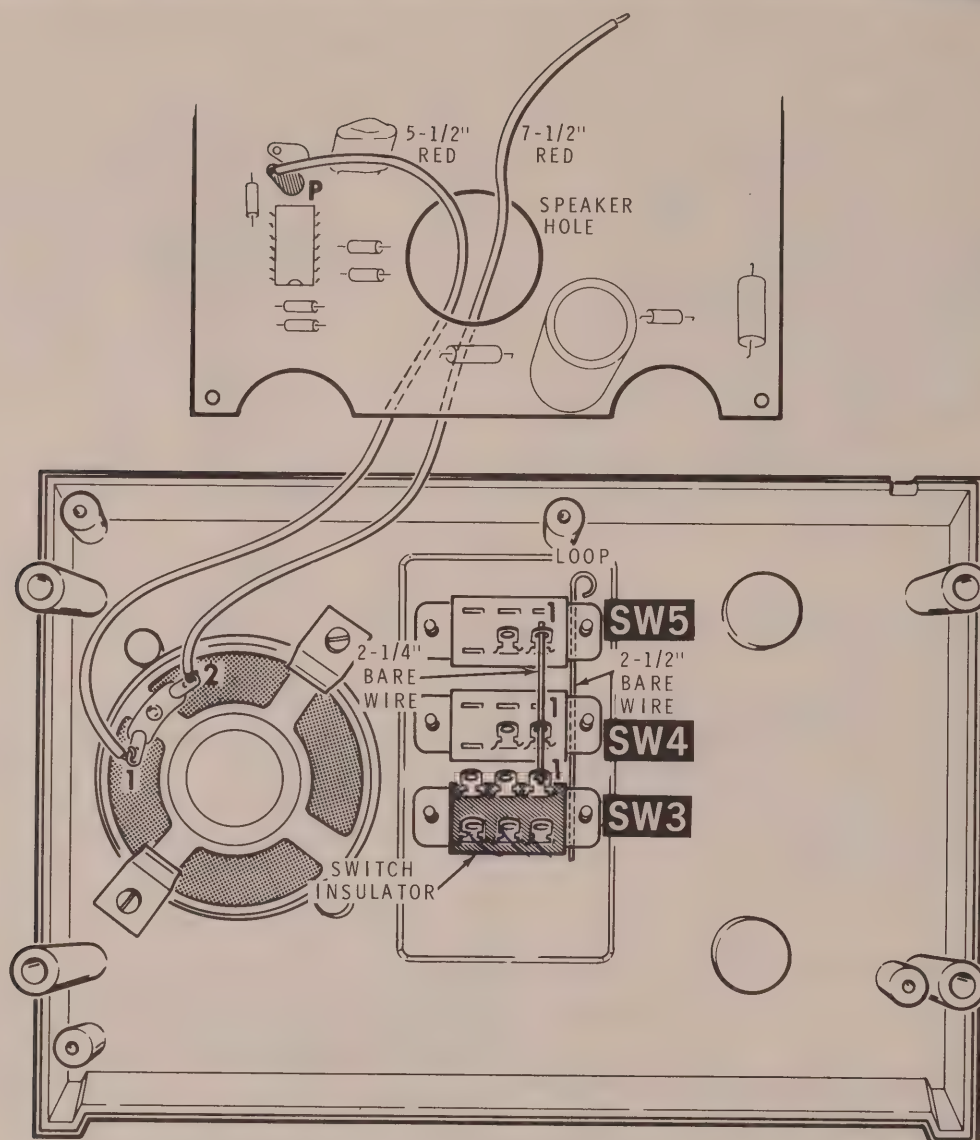
CIRCUIT BOARD CHECKOUT

Carefully inspect the circuit board for the following conditions.

NOTES:

- () Unsoldered connections or pins.
- () Poor solder connections.
- () Solder bridges between foil patterns.
- () Protruding leads which could touch together.
- () Transistors for proper installation.
- () Electrolytic capacitors for the correct position of the positive (+) marking.
- () Diodes for the correct position of the banded ends.

1. If you elected the 12-hour option, you will have two 1N4149 (#56-56) diodes left over. These may be discarded.
2. There are a number of unused holes in the circuit board; you may wish to recheck the 12- and 24-hour option steps to make sure the correct holes have been used. Also note that holes AB and AC will be unused if your power is 60 Hz AC.



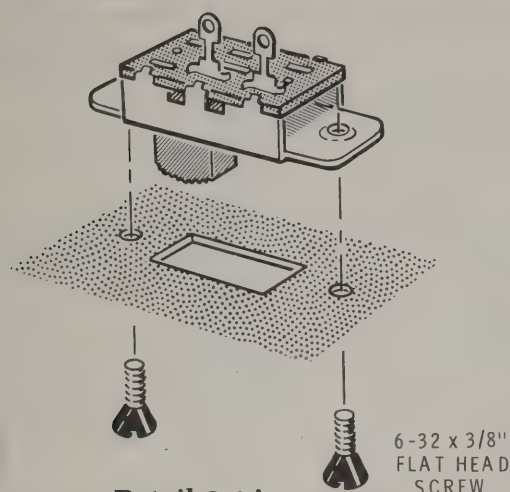
PICTORIAL 2-1

CABINET ASSEMBLY

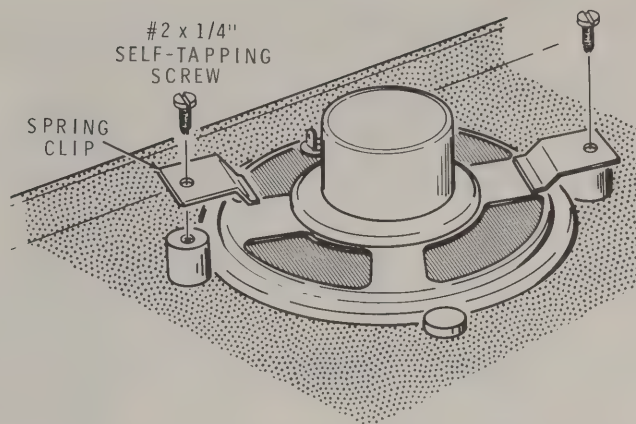
Refer to Pictorial 2-1 for the following steps.

NOTE: It is suggested that you place a soft cloth on your work area as you perform the following steps to avoid scratching your Clock cabinet parts.

- () Position the cabinet bottom on your work area as shown in the Pictorial.
- () SW5: Refer to Detail 2-1A and loosely mount an SPST switch with spring return (#60-6) at SW5. Use two 6-32 \times 3/8" flat head screws. Be sure to position the switch lugs as shown in the Pictorial.
- () SW4: In the same manner, loosely mount another SPST switch with spring return at SW4.
- () SW3: Loosely mount a DPDT switch (#60-2) at SW3 with two 6-32 flat head screws.
- () Cut a 2-1/2" piece of bare wire. Form a small loop in one end of the wire.
- () Refer to Pictorial 2-1 and pass the end of the wire under the indicated ends of switches SW5, SW4, and SW3 as shown.
- () Tighten the six screws on the three switches.



Detail 2-1A



Detail 2-1B

() Place the switch insulator down over the lugs of switch SW3 as shown in the Pictorial.

() Cut a 2-1/4" piece of bare wire.

NOTES:

1. In the following steps, (NS) means not to solder the connections because other wires will be added later. (S-) with a number, such as (S-3), means to solder the connection. The number tells how many wires are at the connection.

2. Where a wire passes through a connection and then goes to another point, as in the next step, it will count as two wires in the solder instructions (S-2), one entering and one leaving the connection. Be especially careful when soldering these connections, to apply enough solder and heat to solder these "through wires."

3. On DPDT switch SW3, you will not use switch lugs 4, 5, and 6 — nearest you in Pictorial 2-1.

() Pass the end of the 2-1/4" bare wire into SW5 lug 1 (S-1), through SW4 lug 1 (NS), and into SW3 lug 1 (S-1). Cut off any excess wire ends on SW3 and SW5.

NOTE: As you install the speaker in the following step, be sure to handle it carefully to avoid damage to the speaker cone.

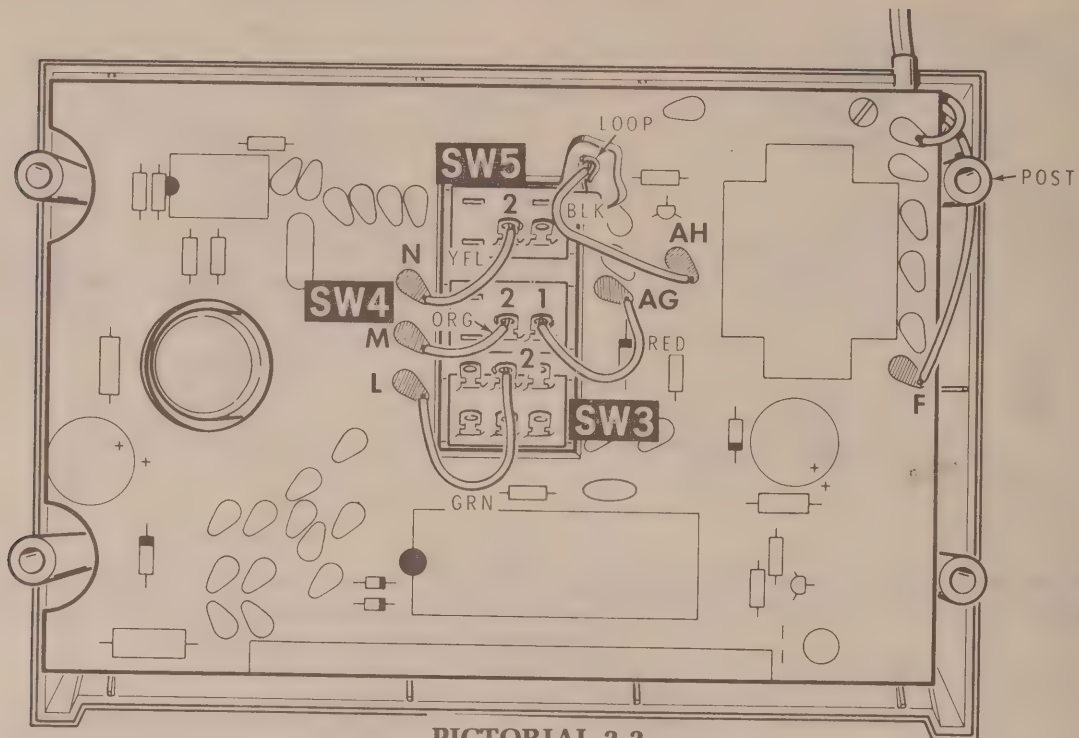
(/) Place the speaker into the cabinet bottom with its lugs positioned as shown in the Pictorial.

(/) Refer to Detail 2-1B and secure the speaker to the cabinet with two #2 × 1/4" self-tapping screws and two spring clips as shown. Perform this step carefully with a small screwdriver to avoid damage to the speaker cone.

() On the circuit board, locate the 5-1/2" red wire coming from P. Pass this wire down through the round (speaker) hole as shown in Pictorial 2-1. Secure this wire to speaker lug 1 (S-1).

() Prepare a 7-1/2" red wire.

() Connect one end of the 7-1/2" red wire to speaker lug 2 (S-1). Pass the other end through the round speaker hole as shown in Pictorial 2-1. You will connect it later.



PICTORIAL 2-2

Refer to Pictorial 2-2 for the following steps.

- () Locate the black wire coming from AH. Pass the free end of this wire through the rectangular opening in the circuit board and connect it to the bare wire loop at SW5 as shown in the Pictorial (S-1).
- () Position the circuit board down into the bottom of the cabinet as shown in the Pictorial. Do not secure the circuit board to the cabinet bottom at this time. Position the line cord wire from F outside the cabinet post as shown.

NOTE: The wires that connect between the circuit board and components mounted on the cabinet are long enough to permit you to temporarily raise the circuit board away from the cabinet, if necessary, without unsoldering any of the connections.

Connect the wires coming from the circuit board to the three cabinet switches as directed in the following steps.

- () Green wire coming from L to SW3 lug 2 (S-1).
- () Orange wire coming from M to SW4 lug 2 (S-1).
- () Yellow wire coming from N to SW5 lug 2 (S-1).
- () Red wire coming from AG to SW4 lug 1 (S-3).

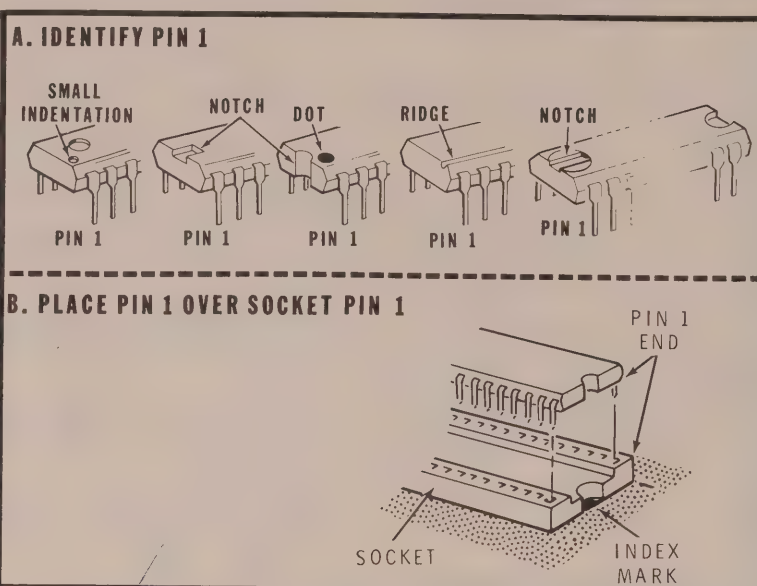
Set the cabinet bottom-circuit board assembly aside temporarily.

Refer to Pictorial 2-3 (Illustration Booklet, Page 2) for the following steps.

- (/) Position the cabinet top on your work area as shown in the Pictorial.
- (/) SW1: Loosely mount the TPDT switch (#60-20) into the cabinet top as shown. Use two 6-32 \times 3/8" flat head screws.
- (/) SW2: Similarly, mount the remaining SPST switch with spring return at SW2 with 6-32 \times 3/8" flat head screws. NOTE: Be sure to position the switch lugs as shown in the Pictorial.
- (/) Cut a 5" piece of bare wire. Form a small loop in one end of the wire.
- (/) Pass the end of the bare wire under switch SW1 and across to SW2. Position the wire close against the shanks of the nearer two screws on SW1 and SW2; then tighten all four switch mounting screws.
- (/) Cut and prepare a 4-1/4" red wire. Connect the red wire from SW2 lug 1 (S-1) to SW1 lug 1 (NS).
- (/) Position the cabinet top close to the back of the cabinet bottom.

- (/) Connect the black wire coming from circuit board callout AK to the bare wire loop at SW1 (S-1).
- (/) Connect the end of the green wire coming from K to switch SW2 lug 2 (S-1).
- (/) Connect the red wire coming from AA to switch SW1 lug 1 (S-2).
- (/) Connect the blue wire coming from AF to SW1 lug 4 (S-1).
- (/) Connect the orange wire coming from J to SW1 lug 2 (S-1).
- (/) Connect the yellow wire coming from G to SW1 lug 5 (S-1).
- (/) Connect the white wire coming from H to SW1 lug 6 (S-1).
- (/) Connect the free end of the 7-1/2" red wire coming from the round speaker hole to switch SW1 lug 8 (S-1).
- (/) Connect the 5-1/2" red wire coming from circuit board hole Q to switch SW1 lug 9 (S-1).
- (/) Check the switch and make sure none of the lugs are shorted together.



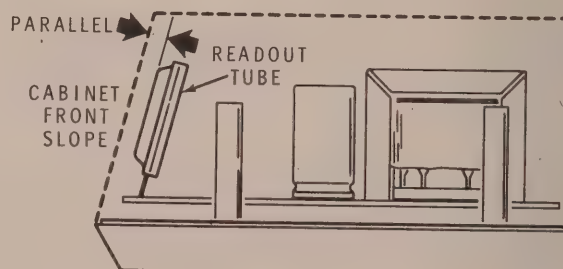


Detail 2-3A

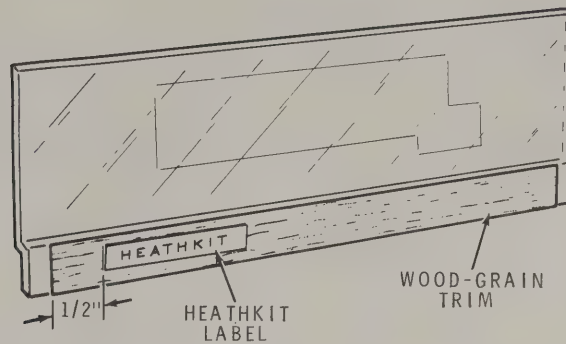
NOTE: The integrated circuits (IC's) that you will install in the next two steps are rugged and reliable components. However, normal static electricity discharged from your body, through an integrated circuit pin to an object, can damage the integrated circuits. Read the instructions first. Then carefully perform each step as follows, without interruption.

1. Remove the IC from its package, with both hands.
2. Hold the IC in one hand, remove the conductive foam, and straighten any bent pins with the other hand.
3. Continue holding the IC, being careful not to touch it to anything, while you pick up and hold the circuit board in your other hand.
4. Align the pin 1 end of the IC with socket pin 1. See Detail 2-3A. Carefully start the IC pins into the sockets; then push the IC down into the sockets. Once the IC's are inserted into the sockets they are protected against static electricity.
5. Be sure each IC is fully seated in its socket. Be sure no pins have folded flat against the underside of the IC. Be sure each pin is in the proper socket hole.

- ✓) IC1: Install the clock IC (#443-848) at IC1.
- ✓) IC2: Install the CD4001 IC (#443-703) at IC2.
- ✓) Check the front (sloped) edge of the cabinet top and bend the readout tube rearward at the top to the same slope on the cabinet. Refer to Detail 2-3B.



Detail 2-3B



Detail 2-3C

- () Tip the cabinet top rearward until it rests on its top side as shown.

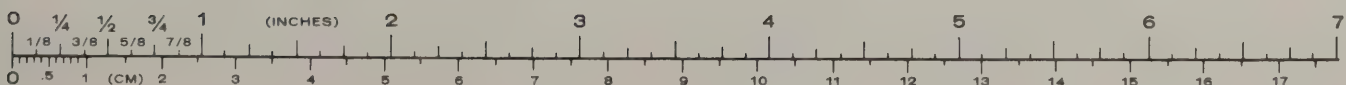
NOTE: In the following steps you will work on and install the cabinet window. If you wish at this time, you may wash the window in a warm, mild detergent solution and dry it with a soft cloth. Thereafter, try to handle the window only by its edges to avoid finger smudges.

Refer to Detail 2-3C for the next four steps.

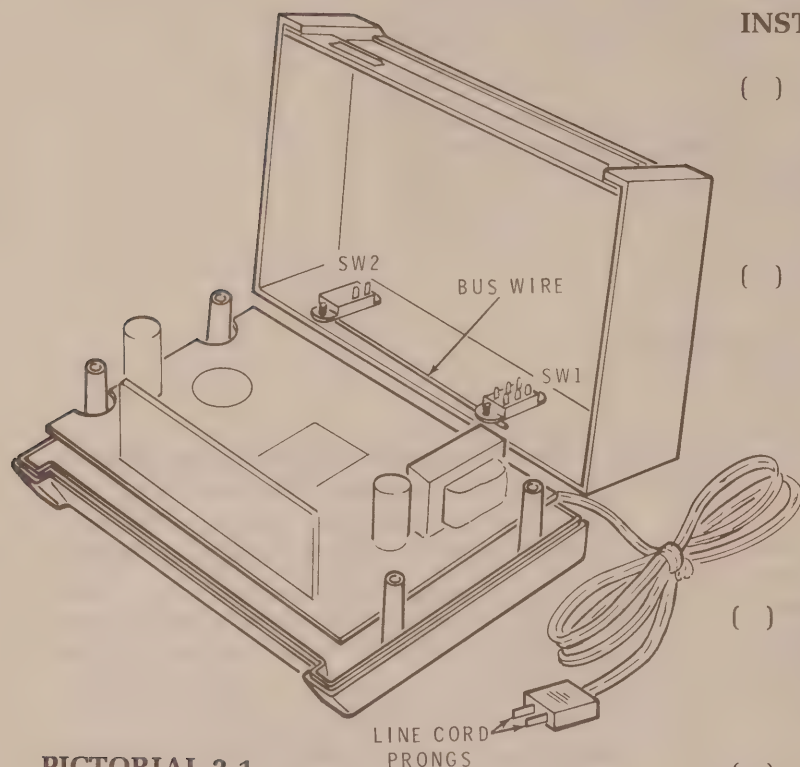
- () 1. Position the window on a soft cloth on your work area as shown. Be sure the narrow flange on the lower edge is facing upward.
- () 2. Locate the wood-grain panel and peel off the narrow (approximately $1/2" \times 6-1/2"$) strip.
- () 3. Carefully position the narrow wood-grain strip onto the lower window flange so the ends of the strip are equally distant from the edges of the window. When you are sure the strip is centered top to bottom and end to end on the flange, press the strip down firmly along its length.

- () 4. Remove the paper backing from the "Heathkit" label. Center the label, from top to bottom, on the wood-grain window strip, $1/2"$ from the left edge of the window as shown.
- () Refer to Pictorial 2-3 and slide the window down into the window cutout in the cabinet top as shown.
- () Locate the $1" \times 1"$ paper insulator. From the insulator cut two $1" \times 1/4"$ pieces. Discard the $1" \times 1/2"$ piece.
- () Remove the paper backing from a $1" \times 1/4"$ piece of insulator. Fold this piece in the center so it forms a right angle; then press the insulator into the left corner of the cabinet top and against the window as shown in Pictorial 2-3.
- () In the same manner, install the other $1" \times 1/4"$ piece of insulator in the right corner of the cabinet top and window.

This completes the step-by-step assembly of your Digital Alarm Clock, except for "Final Assembly." Proceed to the following "Initial Tests."



INITIAL TESTS



PICTORIAL 3-1

Refer to Pictorial 3-1 for the following steps.

NOTES:

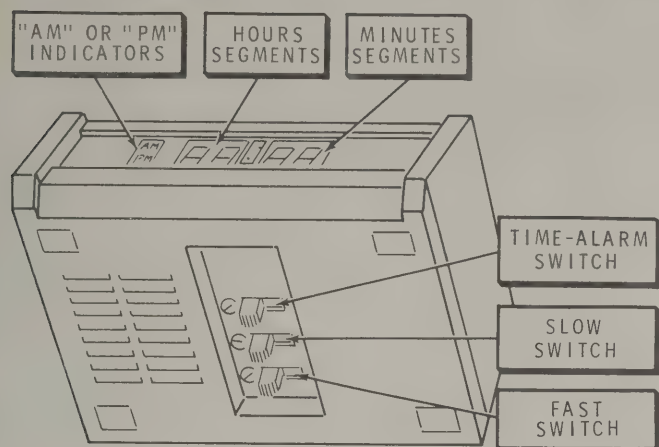
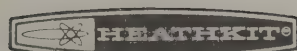
1. Do not plug your Digital Alarm Clock into an AC outlet until you are instructed to do so.
2. If, during the following tests, you fail to obtain the indicated results, refer to the "In Case of Difficulty" section on Page 26.
3. If you have an ohmmeter, perform the steps under "Instrument Tests" in the following section. If you do not have an ohmmeter, proceed directly to "Operational Tests."

INSTRUMENT TESTS

- () Position your Digital Clock on your work area as shown. Set the cabinet top to the rear so it is resting on the back and so the switches are accessible from the inside. Position the circuit board into the cabinet bottom as shown.
- () Connect the ohmmeter common (ground) lead to the bus wire between rear panel switches SW1 and SW2.
- () With the positive ohmmeter lead, measure the resistance first to one line cord prong and then to the other prong. In both cases the reading should be infinity.
- () Connect the common ohmmeter lead to one line cord prong and the positive lead to the other prong. You should get some reading near 200 ohms. If the reading is at or near zero, refer to the "In Case of Difficulty" section of the Manual.

OPERATIONAL TESTS

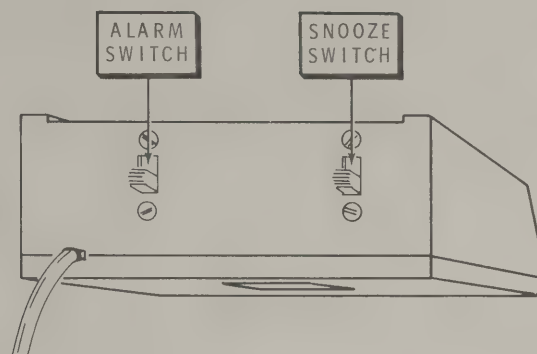
- () Be sure the LDR is still positioned at approximately 45 degrees to the surface of the circuit board, and that the readout tube is slanted slightly rearward.
- () Temporarily position the cabinet top down onto the cabinet bottom.



PICTORIAL 3-2

Refer to Pictorials 3-1, 3-2, and 3-3 as you make the following checks.

- () Plug the line cord into an AC outlet. Since the Clock has no on-off switch, the readout tube should come on.
- () If you assembled your Clock for 12-hour time, the "AM" or the "PM" indicator should blink slowly on and off. If your Clock is to indicate 24-hour time, the left digit of the hours clock segment should blink.
- () Push the ALARM switch down.
- () On the cabinet bottom, briefly push the FAST switch and release it; the blinking indicator on the readout tube should now be steadily lit.
- () On the bottom of the cabinet, push the TIME-ALARM switch to the TIME position.
- () Push and hold the FAST switch slide. The Clock readout should cycle rapidly through a full 12 or 24-hour cycle, and the "AM" and "PM" indicators should change at 12-hour intervals if your clock is wired for a 12-hour indication. Release the FAST switch.
- () Note the time indicated on the Clock.
- () Push the TIME-ALARM switch to ALARM.
- () Push the FAST switch until the readout indicates one hour **earlier** than the time noted above. Release the FAST switch.

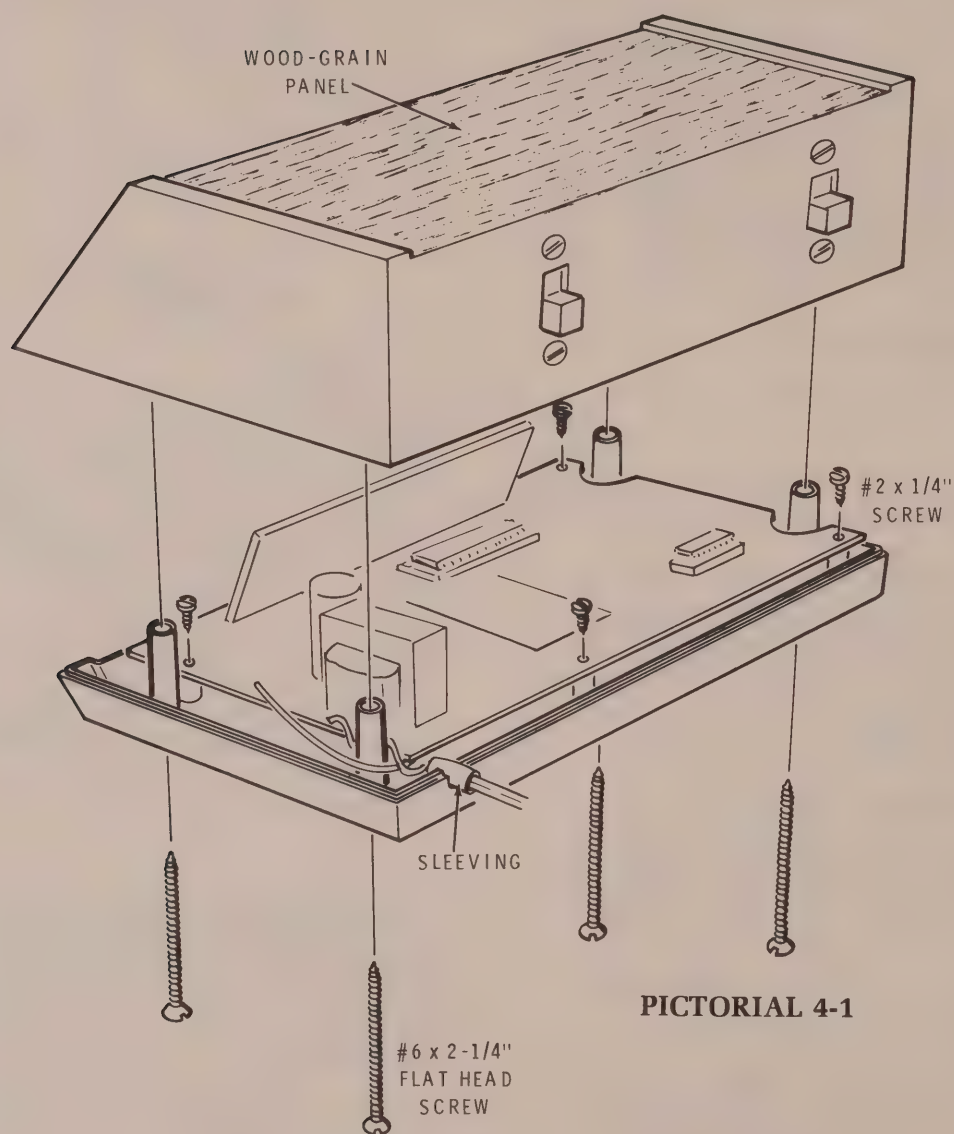


PICTORIAL 3-3

- () Push the SLOW switch. Note that the cycling rate of the Clock is very slow as compared to the previous cycling rate. Continue to cycle at the slow rate until the time indicated is approximately ten minutes **later** than originally set with the TIME switch. Release the SLOW switch.
- () Note the time indicated on the Clock readout. Then push the TIME-ALARM switch to the TIME position. Be sure the time indication is **earlier** than the alarm time set with the SLOW switch above.
- () On the cabinet rear panel, push the ALARM switch upward. Wait a few minutes until the time comes up to the alarm time you set with the TIME-ALARM switch and the SLOW switch. You should now hear a loud sound from the Clock speaker.
- () Operate the SNOOZE switch momentarily; the alarm should stop.
- () Wait approximately nine minutes longer and the alarm should sound again.
- () Push the rear panel ALARM switch down.
- () Remove the line cord from the AC outlet.

This completes the "Initial Tests" of your Clock. Proceed to "Final Assembly."

FINAL ASSEMBLY



PICTORIAL 4-1

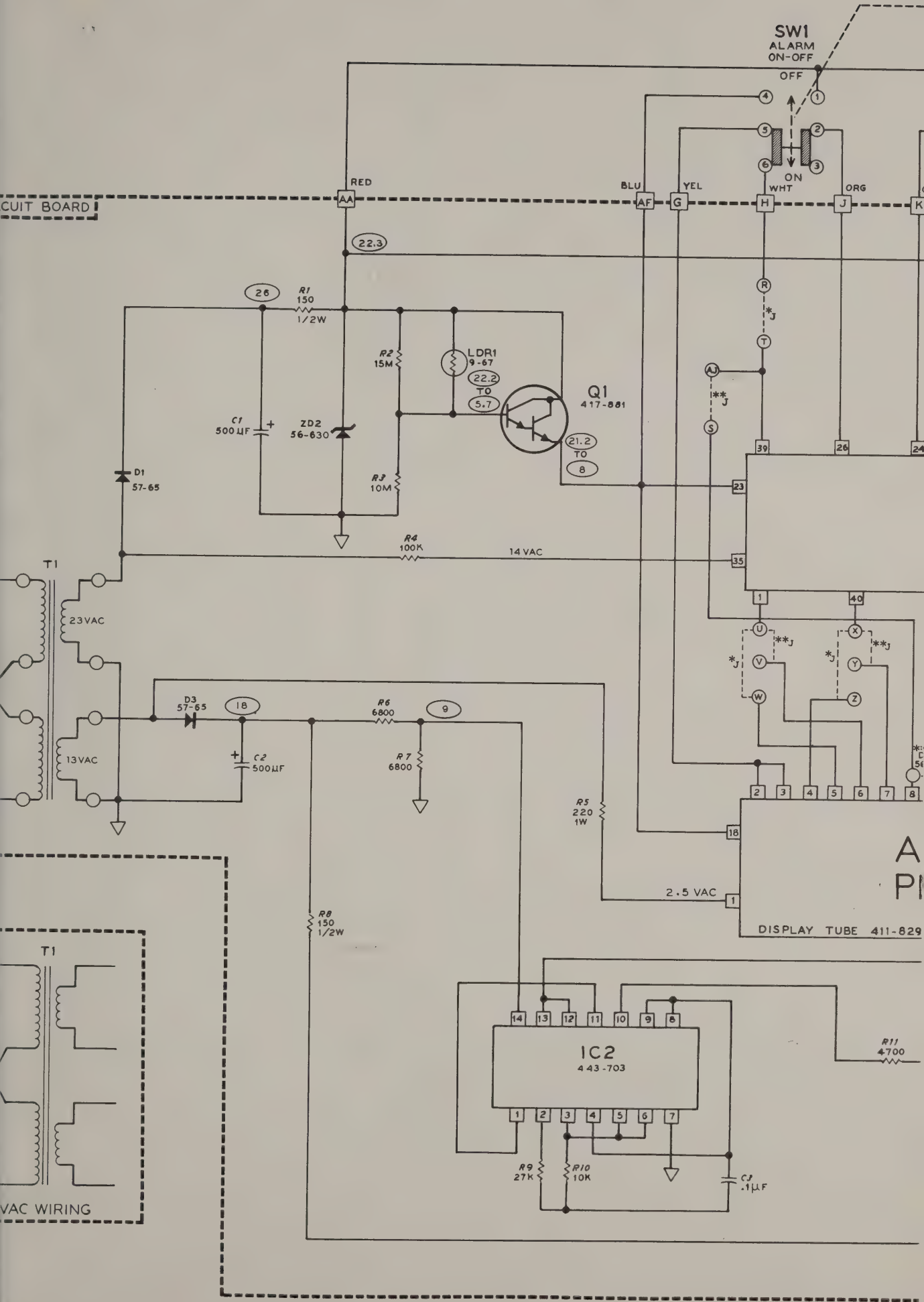
Refer to Pictorial 4-1 for the following steps.

- () Position the circuit board into the cabinet bottom as shown. Then secure the board to the cabinet studs with four #2 × 1/4" screws. Do not overtighten the screws and strip out the screw holes.

- () Place the sleeving on the line cord down into the notch on the rear edge of the cabinet. Position the cabinet top down onto the bottom half as shown and secure the two halves together with four #6 × 2-1/4" flat head screws.

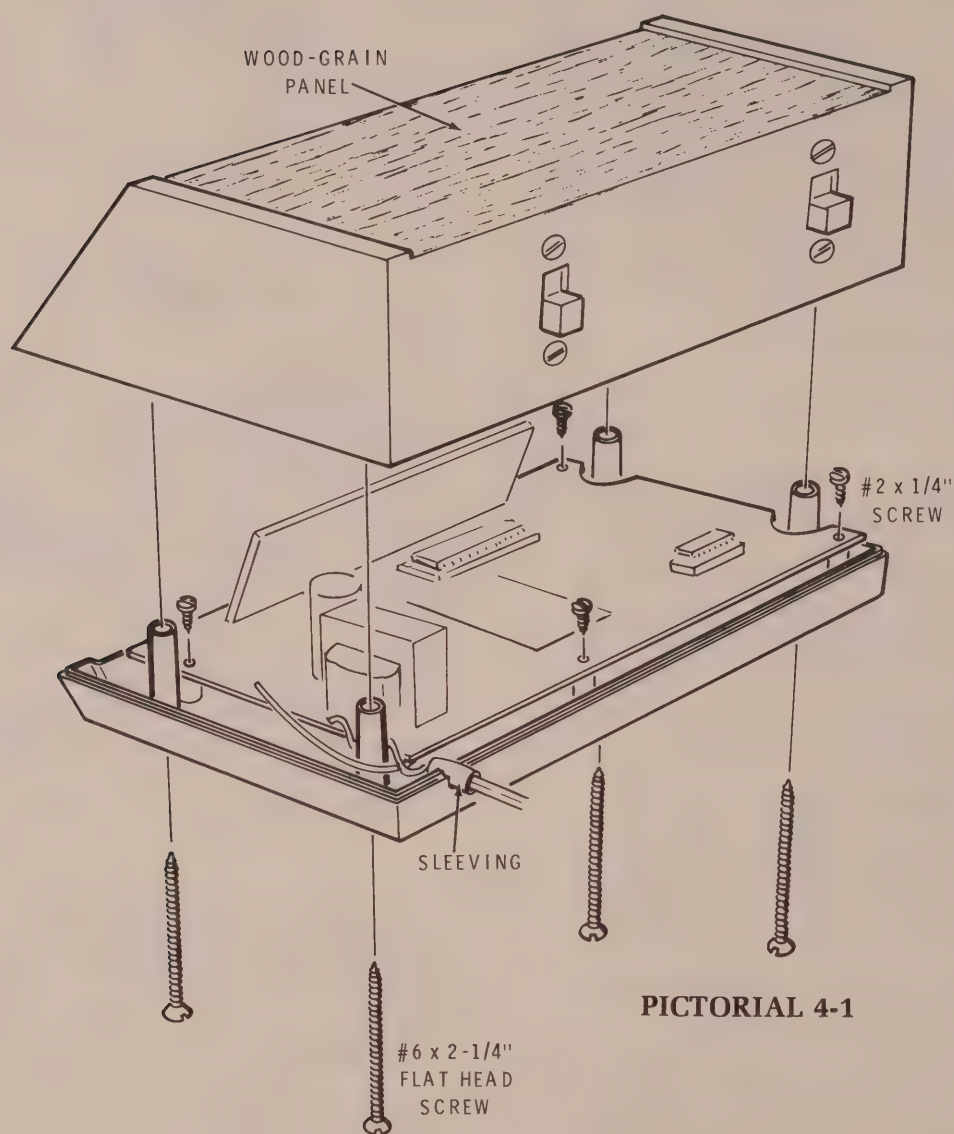
NOTE: In the following step, as you install the wood-grain panel on the top of the cabinet top, perform the operation carefully and slowly. Once the wood-grain panel is in place it is very difficult to lift and reposition the panel.

CUIT BOARD



VAC WIRING

FINAL ASSEMBLY



PICTORIAL 4-1

Refer to Pictorial 4-1 for the following steps.

- () Position the circuit board into the cabinet bottom as shown. Then secure the board to the cabinet studs with four #2 × 1/4" screws. Do not overtighten the screws and strip out the screw holes.

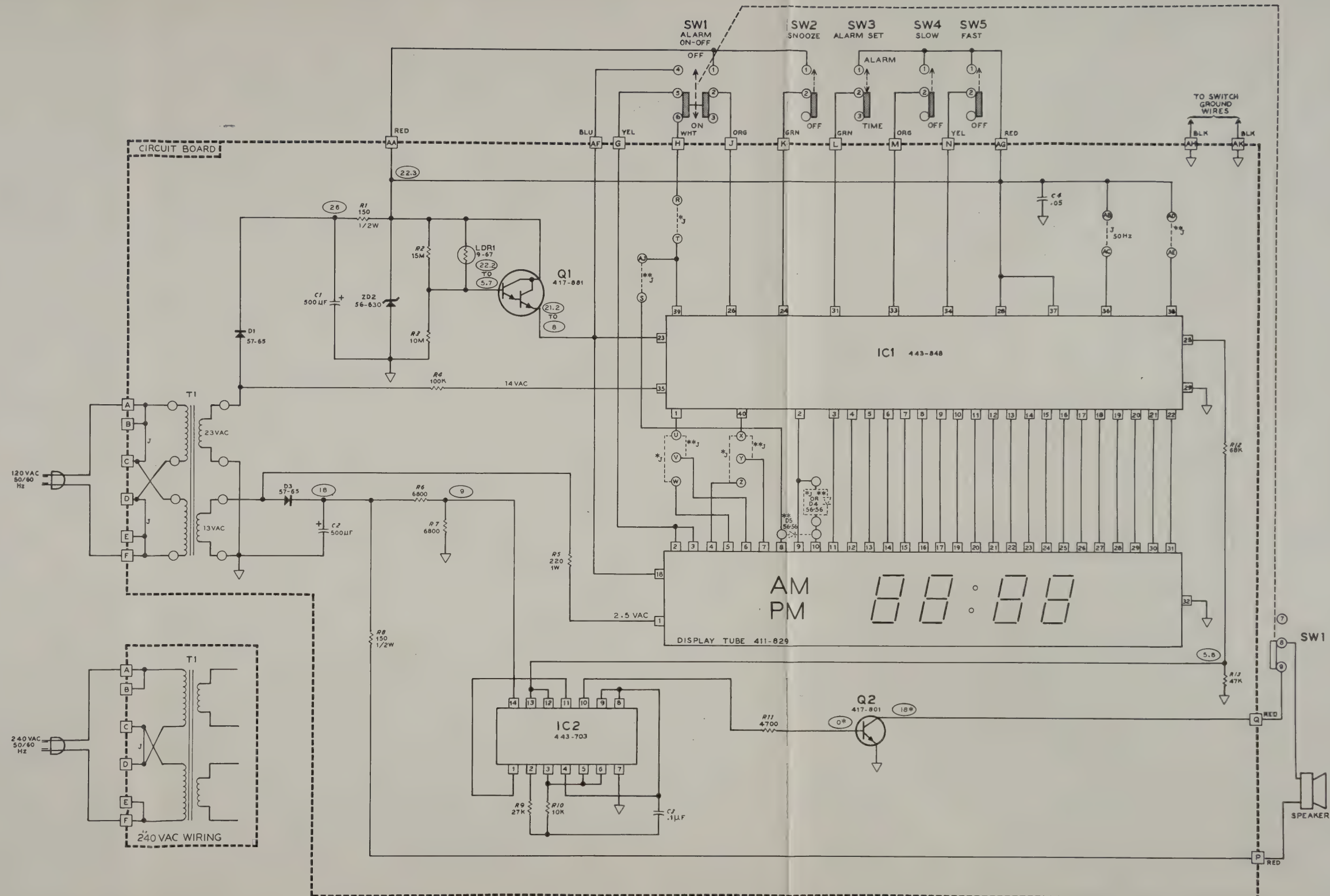
- () Place the sleeving on the line cord down into the notch on the rear edge of the cabinet. Position the cabinet top down onto the bottom half as shown and secure the two halves together with four #6 × 2-1/4" flat head screws.

NOTE: In the following step, as you install the wood-grain panel on the top of the cabinet top, perform the operation carefully and slowly. Once the wood-grain panel is in place it is very difficult to lift and reposition the panel.

**SCHEMATIC OF THE
HEATHKIT®
DIGITAL ALARM CLOCK
MODEL GC-1107**






NOTES:

1. RESISTOR VALUES ARE IN OHMS (K = 1000, M = 1,000,000).
2. ALL RESISTORS ARE 1/4 WATT, 5% TOLERANCE UNLESS OTHERWISE NOTED.
3. ALL CAPACITOR VALUES ARE IN μ F (MICROFARADS).
4. ∇ THIS SYMBOL INDICATES A CIRCUIT BOARD GROUND.
5. \square THIS SYMBOL INDICATES A CIRCUIT BOARD WIRE CONNECTION.
6. $_{-j}$ THIS SYMBOL INDICATES A CONNECTION USED IN THE 12-HOUR MODE OF OPERATION.
7. $_{**j}$ THIS SYMBOL INDICATES A CONNECTION USED IN THE 24-HOUR MODE OF OPERATION.
8. \bigcirc THIS SYMBOL INDICATES A DC VOLTAGE MEASURED WITH A HIGH INPUT IMPEDANCE VOLTMEETER FROM THE POINT INDICATED TO CIRCUIT BOARD GROUND. VOLTAGES MAY VARY $\pm 10\%$. VOLTAGES IN THE DIMMING CIRCUIT OF TRANSISTOR Q1 DEPEND ON THE AMOUNT OF LIGHT DETECTED BY LDR1. *ALARM OFF.
9. DIODES D4 AND D5 ARE USED ONLY IN THE 24-HOUR MODE OF OPERATION.



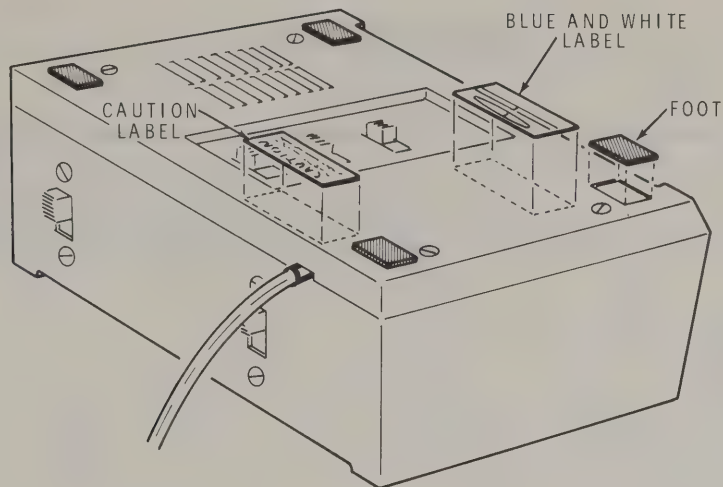
SCHEMATIC OF THE HEATHKIT® DIGITAL ALARM CLOCK MODEL GC-1107

NOTES:

1. RESISTOR VALUES ARE IN OHMS (K = 1000, M = 1,000,000).
2. ALL RESISTORS ARE 1/4 WATT, 5% TOLERANCE UNLESS OTHERWISE NOTED.
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4.  THIS SYMBOL INDICATES A CIRCUIT BOARD GROUND.
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7.  THIS SYMBOL INDICATES A CONNECTION USED IN THE 24-HOUR MODE OF OPERATION.
8.  THIS SYMBOL INDICATES A DC VOLTAGE MEASURED WITH A HIGH INPUT IMPEDANCE VOLTMETER FROM THE POINT INDICATED TO CIRCUIT BOARD GROUND. VOLTAGES MAY VARY $\pm 10\%$. VOLTAGES IN THE DIMMING CIRCUIT OF TRANSISTOR Q1 DEPEND ON THE AMOUNT OF LIGHT DETECTED BY LDR1. *ALARM OFF.
9. DIODES D4 AND D5 ARE USED ONLY IN THE 24-HOUR MODE OF OPERATION.

120 VAC
50/60
Hz

240 VAC
50/60
Hz



PICTORIAL 4-2

- () Peel the wood-grain panel from its paper backing. Position the panel along the front edge of the clock, squarely in the center of the depressed area. Carefully smooth the panel, from the front toward the rear, until it is in place. NOTE: If any air bubbles should occur, lift the nearest corner slightly and work the bubble toward that corner with your fingertip until the panel is smooth.
- () With a soft cloth, smooth the wood-grain panel firmly down onto the cabinet top.

Refer to Pictorial 4-2 for the following steps.

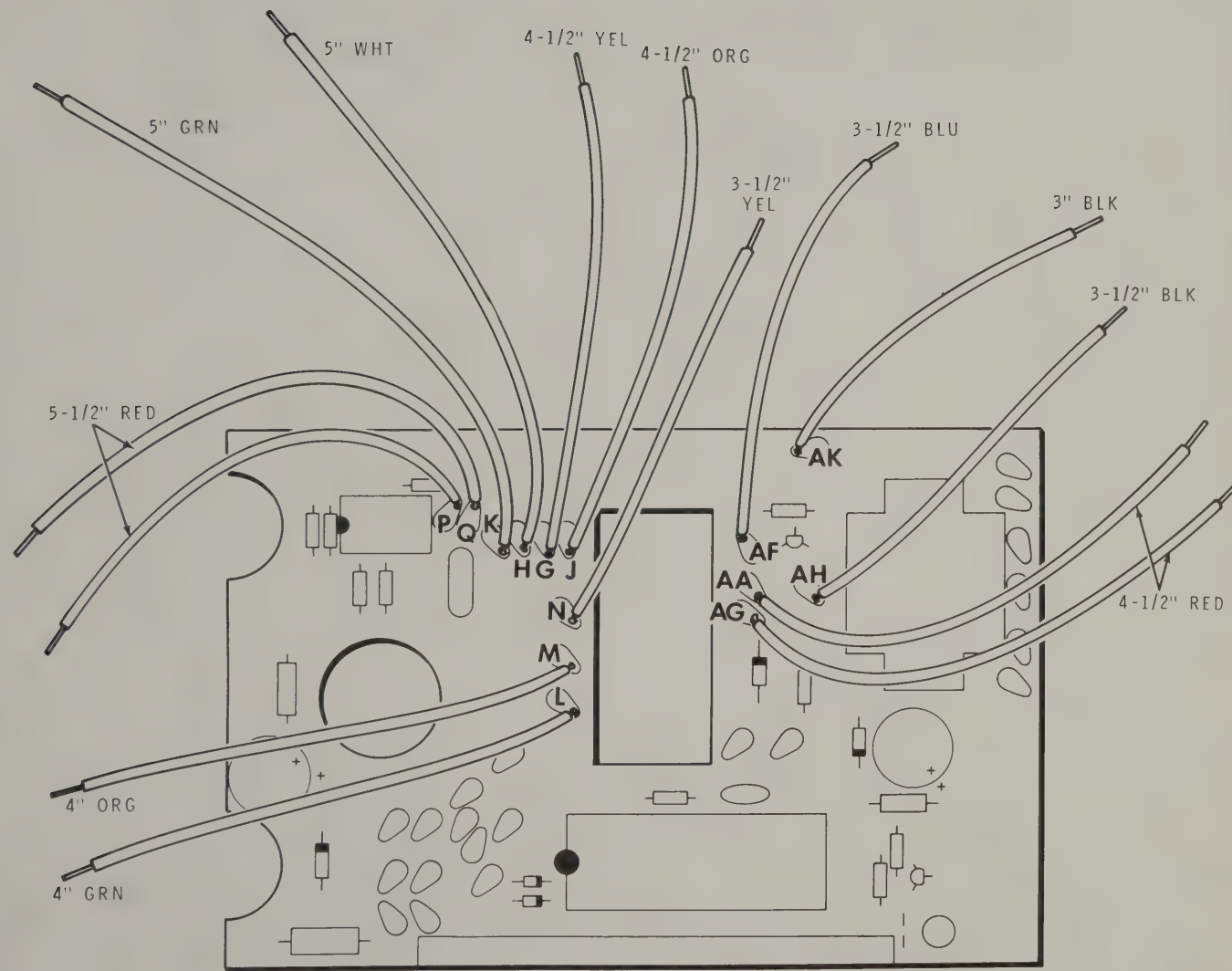
- () Turn the Clock cabinet over so it is resting on its top as shown in the Pictorial.
- () Peel the backing from the "Caution" label and press the label in place as shown.

- () Peel the backing from the blue and white label and press the label in place on the cabinet bottom in the area shown. NOTE: Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.
- () Remove the paper backing from one of the feet. Press the foot in place in the rectangular area near one corner of the cabinet bottom.
- () In the same manner, install the other three feet near the remaining corners of the cabinet as shown.

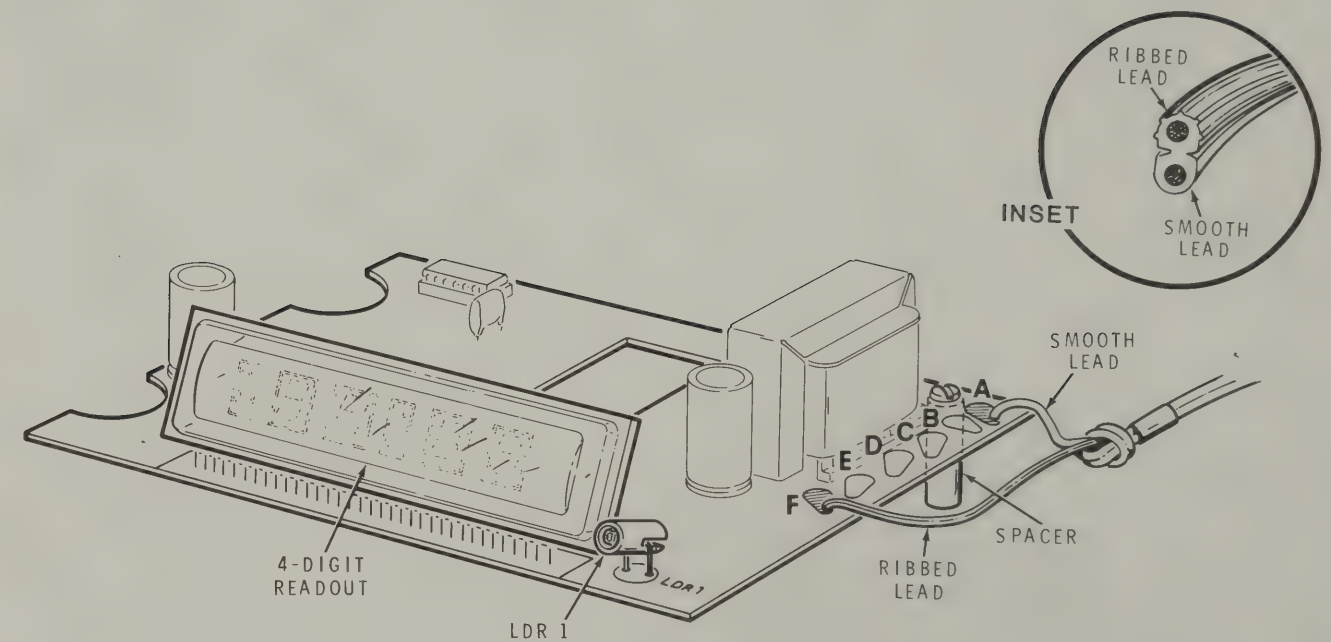
This completes the "Final Assembly" of your Digital Alarm Clock.

ILLUSTRATION BOOKLET

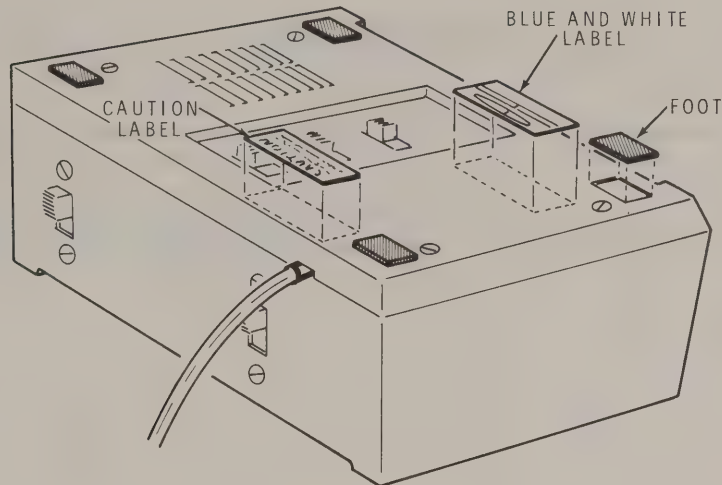
Part of 595-2049-03



PICTORIAL 1-7



PICTORIAL 1-8



PICTORIAL 4-2

- () Peel the wood-grain panel from its paper backing. Position the panel along the front edge of the clock, squarely in the center of the depressed area. Carefully smooth the panel, from the front toward the rear, until it is in place. NOTE: If any air bubbles should occur, lift the nearest corner slightly and work the bubble toward that corner with your fingertip until the panel is smooth.
- () With a soft cloth, smooth the wood-grain panel firmly down onto the cabinet top.

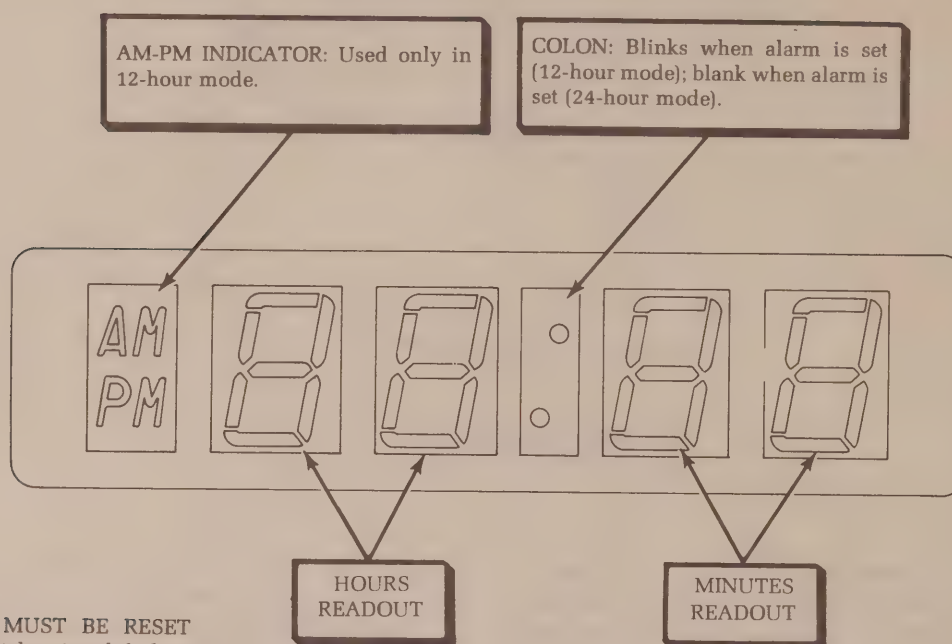
Refer to Pictorial 4-2 for the following steps.

- () Turn the Clock cabinet over so it is resting on its top as shown in the Pictorial.
- () Peel the backing from the "Caution" label and press the label in place as shown.

- () Peel the backing from the blue and white label and press the label in place on the cabinet bottom in the area shown. NOTE: Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.
- () Remove the paper backing from one of the feet. Press the foot in place in the rectangular area near one corner of the cabinet bottom.
- () In the same manner, install the other three feet near the remaining corners of the cabinet as shown.

This completes the "Final Assembly" of your Digital Alarm Clock.

OPERATION

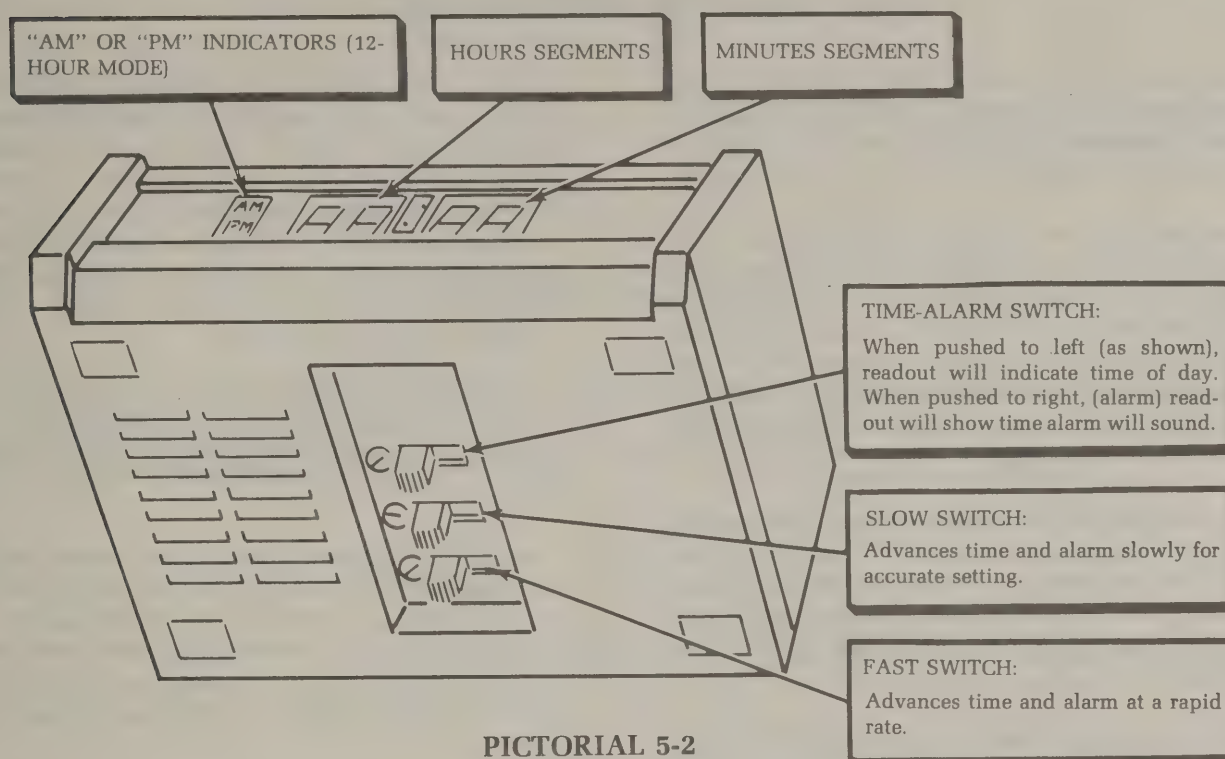


NOTE: CLOCK MUST BE RESET when AM-PM (12-hour) or left digit blinks; this indicates power has been interrupted.

PICTORIAL 5-1

Refer to Pictorials 5-1, 5-2 (above), and 5-3 (Illustration Booklet, Page 2) which illustrate the readout and switches as described in the following text.

1. **ALARM ON-OFF SWITCH:** Turns the alarm on and off; up is On. NOTE: After the alarm sounds, if you wish, you may turn the alarm off and immediately return the switch to the On position; the alarm will sound after another 24 hours.
2. **SNOOZE ALARM SWITCH:** Resets the alarm to go off approximately nine minutes later.
3. **FAST SET-AHEAD SWITCH:** Advances the display sixty minutes each second.
4. **SLOW SET-AHEAD SWITCH:** Advances the display one minute each half second.
5. **TIME-ALARM SWITCH:** Allows you to set the alarm using the FAST and SLOW-SET-AHEAD switches. Also allows the display to indicate the time for which the alarm is set. (Time continues to be kept even though it is not displayed when this switch is used in the ALARM position). Return the switch to TIME after you set the alarm; the Clock display will return to the correct time display.
6. **AM-PM INDICATOR:** Indicates 12-hour segment of the day, either "AM" or "PM", when the Clock is wired for 12-hour operation. Also active when you set the alarm.
7. **HOURS AND MINUTES READOUT:** Indicated the time of day or the time the alarm is set for, depending on the setting of the TIME-ALARM switch.



8. **COLON:** A steady colon indicates that the alarm is Off. In the 12-hour mode, a flashing colon indicates that the alarm is set to On. In the 24-hour mode, the colon will be blank when the alarm switch is On.

TO SET THE TIME

1. Push the FAST SET-AHEAD and SLOW SET-AHEAD switches as necessary to advance the display to the desired time. Be sure the AM or PM indicator is as desired. The AM-PM indicator is inactive in the 24-hour mode of operation.

TO SET THE ALARM

1. Push the TIME-ALARM switch to the ALARM position. The clock will continue to keep the correct time even though the alarm display is stationary.

2. Push the FAST SET-AHEAD and SLOW SET-AHEAD switches as necessary to advance the display to a desired alarm time. Be sure the AM-PM indicator appears as desired. The AM-PM indicator is inactive in the 24-hour mode of operation.

3. Push the TIME-ALARM switch to the TIME position.

4. Set the alarm. Push up the ALARM ON-OFF switch. Observe that the colon will blink on and off (12-hour mode) or blank out (24-hour mode).

IN CASE OF DIFFICULTY

This section of the Manual is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your Clock is assembled.

The second part, titled "Troubleshooting Chart", is provided to assist you in servicing the Clock if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after your Clock has been in use for some time. The "Troubleshooting Chart" lists a number of possible difficulties that could arise along with several possible solutions to those difficulties.

Try to analyze the symptoms of any problem you might have before starting any troubleshooting procedure. You can usually do this by trying the various functions of your Clock to determine abnormal operations. A review of the "Operation" section may help your analysis.

NOTE: Refer to the "Circuit Board X-Ray Views" on Page 30 for the physical location of parts on the circuit board.

GENERAL TROUBLESHOOTING INFORMATION

1. Check all the wires that are connected between the circuit board and other parts. Trace each wire in colored pencil on the Pictorial as you check it. Make sure these wires are connected to the proper points and are properly soldered. Someone not familiar with the unit may notice something you have consistently overlooked.
2. Be sure the IC's are seated properly in their sockets.
3. About 90% of the kits that are returned for repair do not function properly because of poor connections and soldering. Therefore, many troubles can be located by a careful inspection of connections to make sure they are soldered as described in the "Soldering" section of the "Kit Builders Guide." Reheat any doubtful connections.
4. Closely examine each circuit board foil in a good light to see that no solder bridges exist between adjacent connections. If available, a magnifying glass would be helpful for this purpose. Remove any solder bridges by holding a clean, hot soldering iron tip between the two points that are bridged until the excess solder flows down onto the tip. Compare your foil pattern against the "X-Ray Views" on Page 30.
5. Be sure each transistor is in its proper location. Be sure that each transistor lead is in the right hole and has a good solder connection to the foil.
6. Check the integrated circuits for proper positioning. (Be sure the dot or notched end of the IC is over the dot printed on the circuit board).
7. Check each electrolytic capacitor to be sure the lead near the positive (+) marking is at the correct position.
8. Check each resistor value carefully. If would be easy, for example, to install a 4700 Ω (yellow-violet-red) resistor where a 47 k Ω (yellow-violet-orange) resistor is called for. A resistor that is discolored, or cracked, or shows any sign of bulging would indicate that it is damaged and should be replaced. Since damaged resistors are often the result of some other difficulty (such as faulty wiring), you should try to find out what caused the damage before you replace the part.
9. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.
10. Check all component leads connected to the circuit boards. Make sure the leads do not extend through the circuit board and come in contact with other connections or parts.

If you still cannot locate and correct the trouble after the above tests are completed, and if a voltmeter is available, check your Clock's voltages against the voltages shown on the Schematic Diagram (fold-in).

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information at the rear of the Manual. Your Warranty is also located inside the rear of the Manual.

Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE
1. Incorrect readout segments lit.	<ol style="list-style-type: none"> Poor solder connections or solder bridges. Integrated circuit IC1. Display tube. Incorrect jumper wires installed.
2. Time does not advance.	<ol style="list-style-type: none"> Time-Alarm switch incorrectly set at Alarm position. Resistor R4. Integrated circuit IC1.
3. Readout display does not light, or is very dim even under bright room lighting.	<ol style="list-style-type: none"> Diodes D1 or ZD2. Transistor Q1. Light dependent resistor LDR1. Resistors R2, R3, or R5.
4. Clock gains time.	<ol style="list-style-type: none"> 50 Hz jumper (AB-AC) installed and you have 60 Hz service.
5. Alarm does not work properly.	<ol style="list-style-type: none"> Transistor Q2. Diode D3. Integrated circuit IC2. Switches SW1 or SW2. Speaker.
6. Readout display does not dim.	<ol style="list-style-type: none"> Light dependent resistor LDR1. Transistor Q1.
7. Alarm-On indicator (colon) does not function properly.	<ol style="list-style-type: none"> Alarm switch SW1.
8. Speaker buzzes.	<ol style="list-style-type: none"> Wire or lead ends in speaker cone.

SPECIFICATIONS

Display	Four full-fluorescent digits, AM and PM indicators, and colon.
Format	12 or 24 hour.
Accuracy	As determined by line frequency.
Snooze Alarm	Recycles at nine-minute intervals.
Power Requirement	3.5 watts, 120 or 240 VAC, 50 or 60 Hz.
Dimensions	7" wide × 5" deep × 2-1/2" high (16.8 × 12 × 6cm).
Weight	1-3/4 lbs. (.79 kg).

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

CIRCUIT DESCRIPTION

Refer to the fold-in Schematic Diagram and Schematic Notes as you read the following Circuit Description.

All the digital logic for the Clock is performed inside integrated circuit IC1. The remaining external circuits provide DC power, dimming control, and an alarm oscillator.

Diode D1, capacitor C1, resistor R1, and zener diode ZD2 form a DC supply for IC1 and the display tube. This voltage is also used by the switch circuits of SW1 through SW5 and it provides control signals to IC1. Time regulation is derived from the line frequency and is applied as an AC signal through resistor R4 to IC1.

The segment anodes of the fluorescent display tube are driven directly by the display drivers within IC1. The display filament is heated by an AC voltage applied through resistor R5 to display tube pin 1. A DC grid bias voltage, controlled by a dimming circuit, is applied to display tube pin 18.

Resistors R2 and R3, with light-dependent resistor LDR1 and transistor Q1 form a dimming circuit. As the intensity of the surrounding room light increases

or decreases, the internal resistance of LDR1 varies accordingly. When the room lighting is bright, the resistance of LDR1 decreases to permit a higher forward bias on the base of transistor Q1. This causes more current to flow in Q1 and the emitter voltage goes up. Since the emitter of Q1 is connected directly to pin 18 of the display tube, a greater voltage causes the tube to conduct harder to create a brighter display. The opposite is true when the surrounding light is dimmer; the resistance of LDR1 is increased, the emitter voltage of Q1 is lowered, and the grid bias voltage at pin 18 is lowered to cause the display tube to conduct less. This produces a dimmer display for a lowered light intensity outside the Clock.

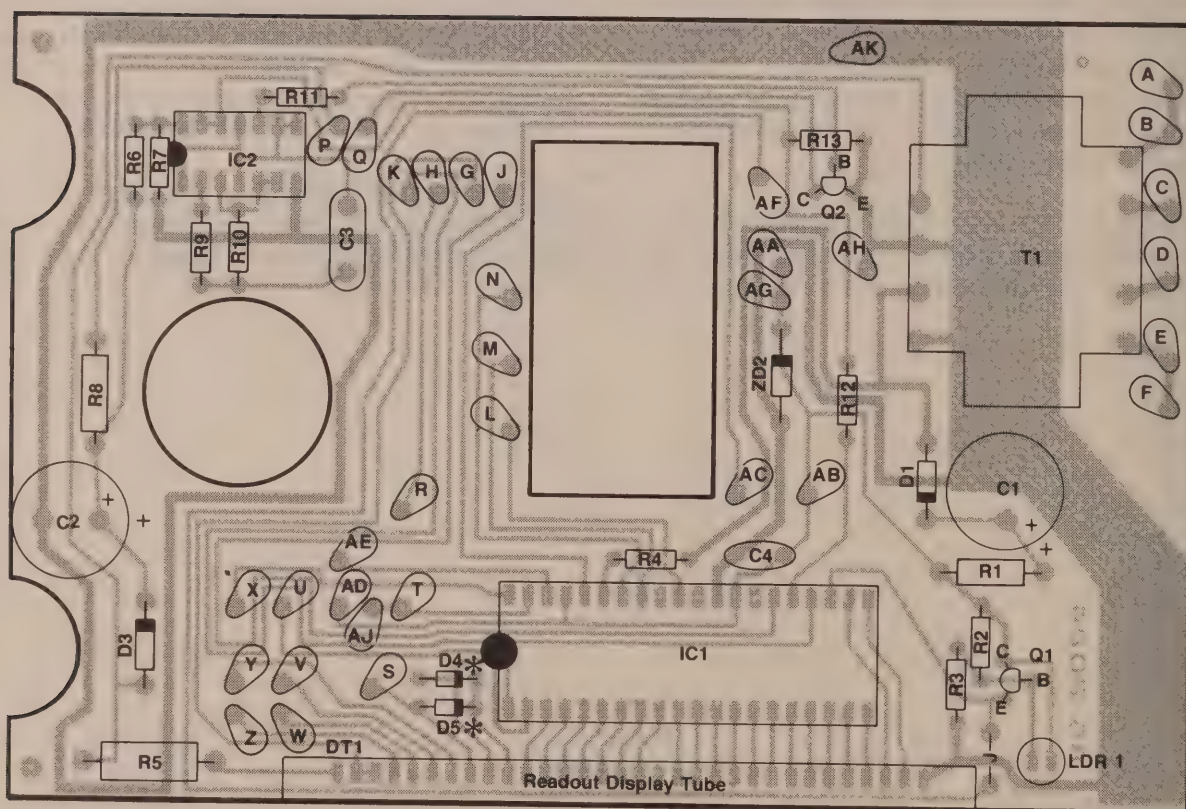
Diode D3 and capacitor C2 provide a second DC voltage for the alarm circuits. Integrated circuit IC2 and capacitor C3, with resistors R9 and R10, form a square-wave oscillator which is turned on and off by a control signal from pin 25 of integrated circuit IC1. Transistor Q2 is the driver for the speaker.

Dual primary transformer T1 can be wired to operate from either 120 or 240-volt AC power sources. Separate secondary windings in T1 provide the voltages needed for the two DC supplies.

CIRCUIT BOARD X-RAY VIEW

NOTE: To find the PART NUMBER of a component for the purpose of ordering a replacement part:

- A. Find the circuit component number (R3, C1, etc.) on the "X-Ray View."
- B. Locate this same number in the "Circuit Component Number" column of the "Parts List."
- C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION, which must be supplied when you order a replacement part.

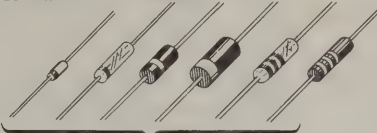


(Shown from component side.)

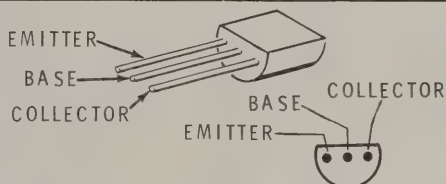
*NOTE: Diodes D4 and D5 are 24-hour display options.

SEMICONDUCTOR IDENTIFICATION CHARTS

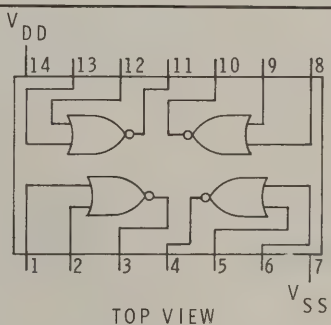
DIODES

COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
D1, D3	57-65	1N4002	<p>IMPORTANT: THE BANDED END OF DIODES CAN BE MARKED IN A NUMBER OF WAYS.</p>  <p>BANDED END</p>
ZD2	56-630	1N4748A	
D4 D5 (optional)	56-56	1N4149	

TRANSISTORS

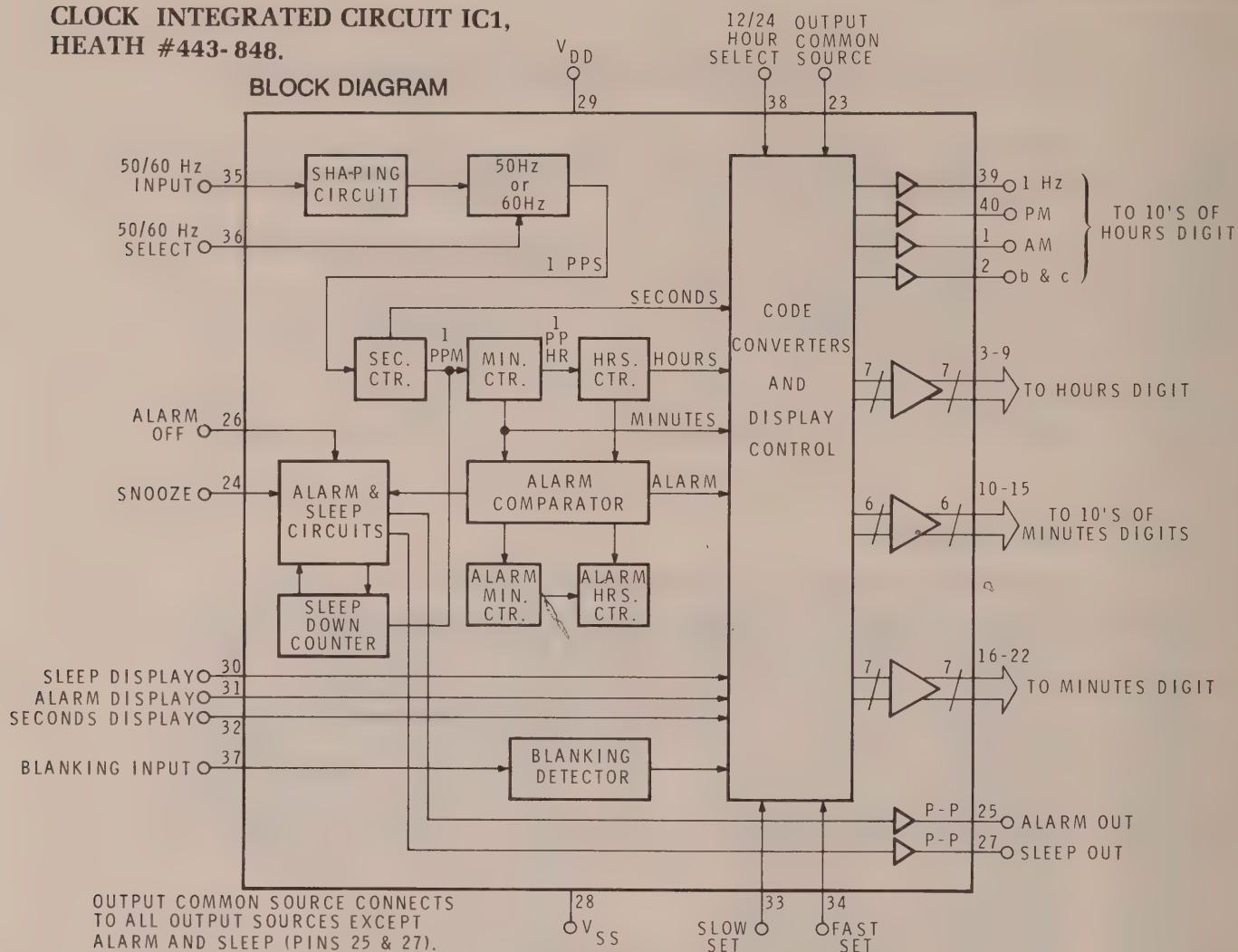
COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
Q1	417-881	MPSA13	
Q2	417-801	MPSA20	

INTEGRATED CIRCUITS

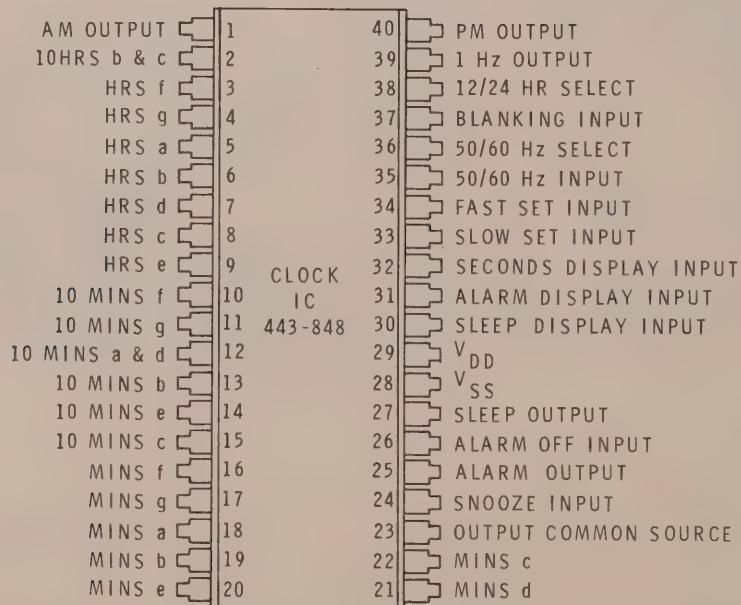
COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
IC2	443-703	CD4001	 <p>TOP VIEW</p>

CLOCK INTEGRATED CIRCUIT IC1, HEATH #443-848.

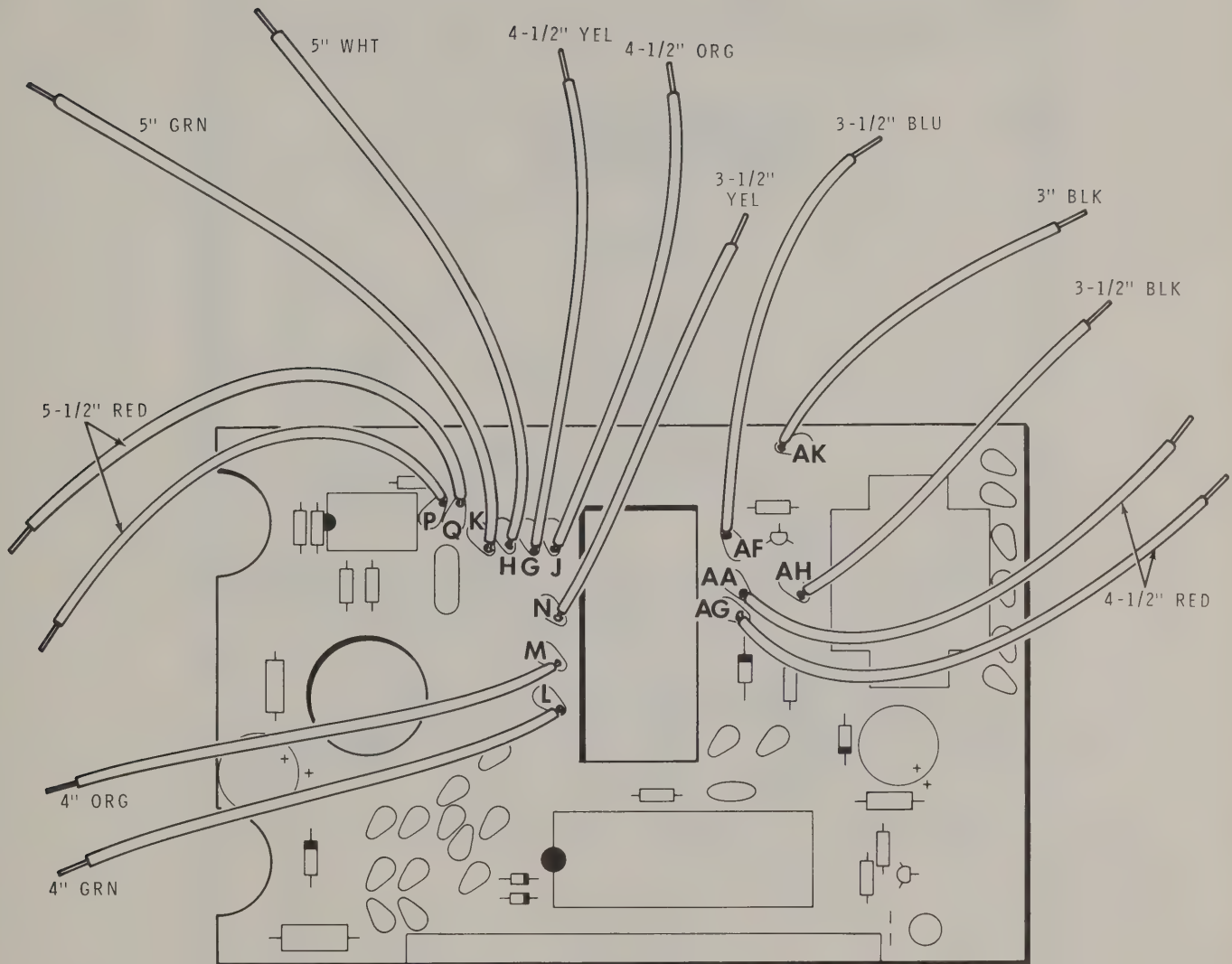
BLOCK DIAGRAM



PIN-OUT DIAGRAM



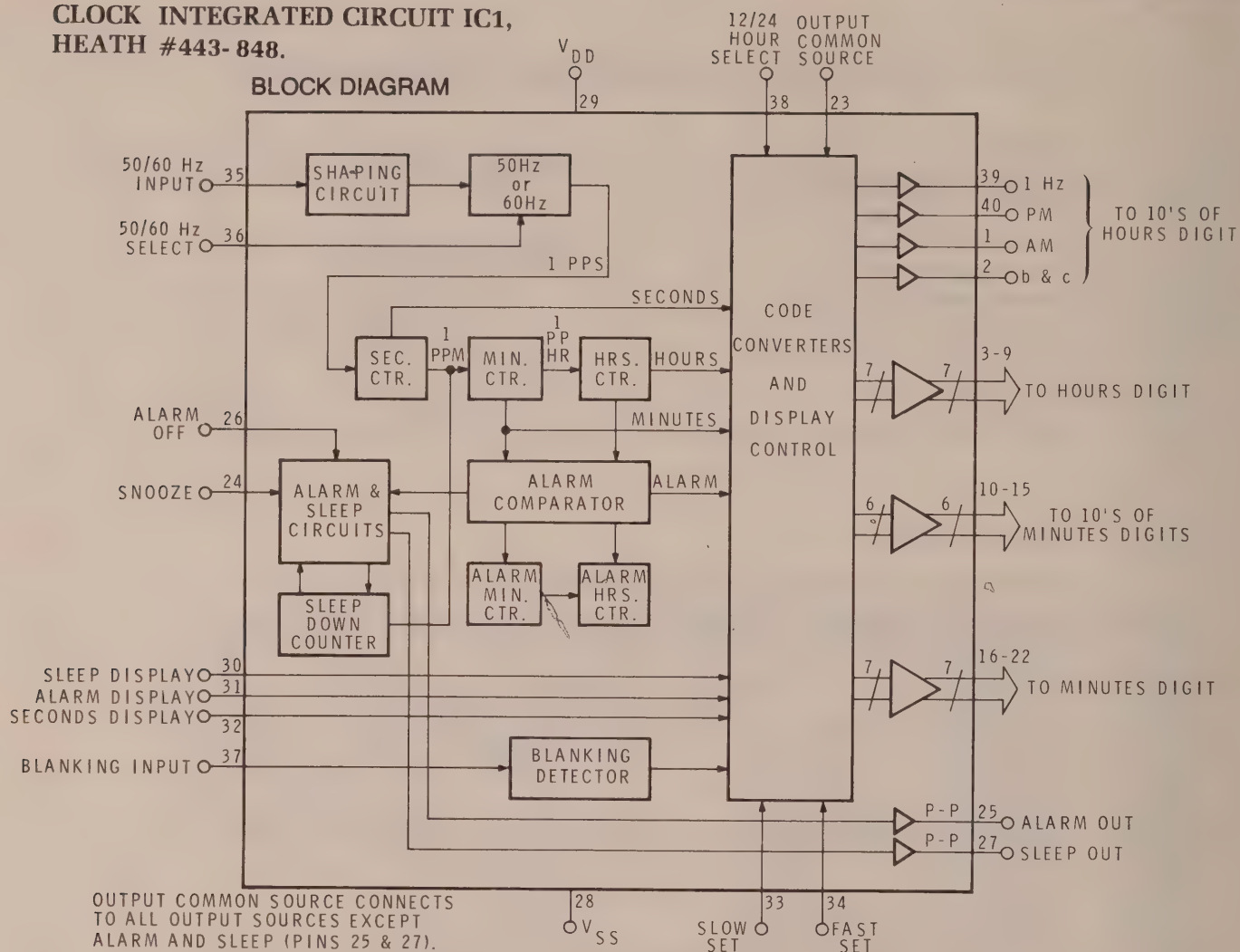
ILLUSTRATION



PICTORIAL 1-7

CLOCK INTEGRATED CIRCUIT IC1, HEATH #443-848.

BLOCK DIAGRAM



PIN-OUT DIAGRAM

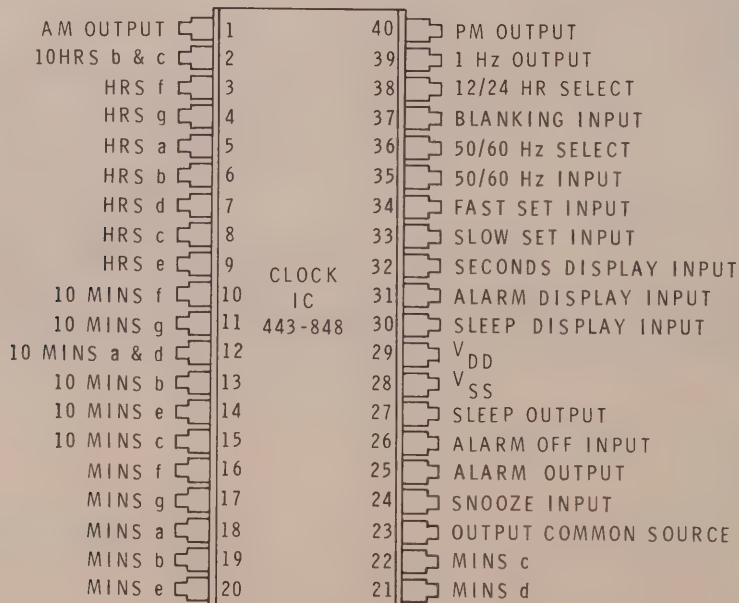
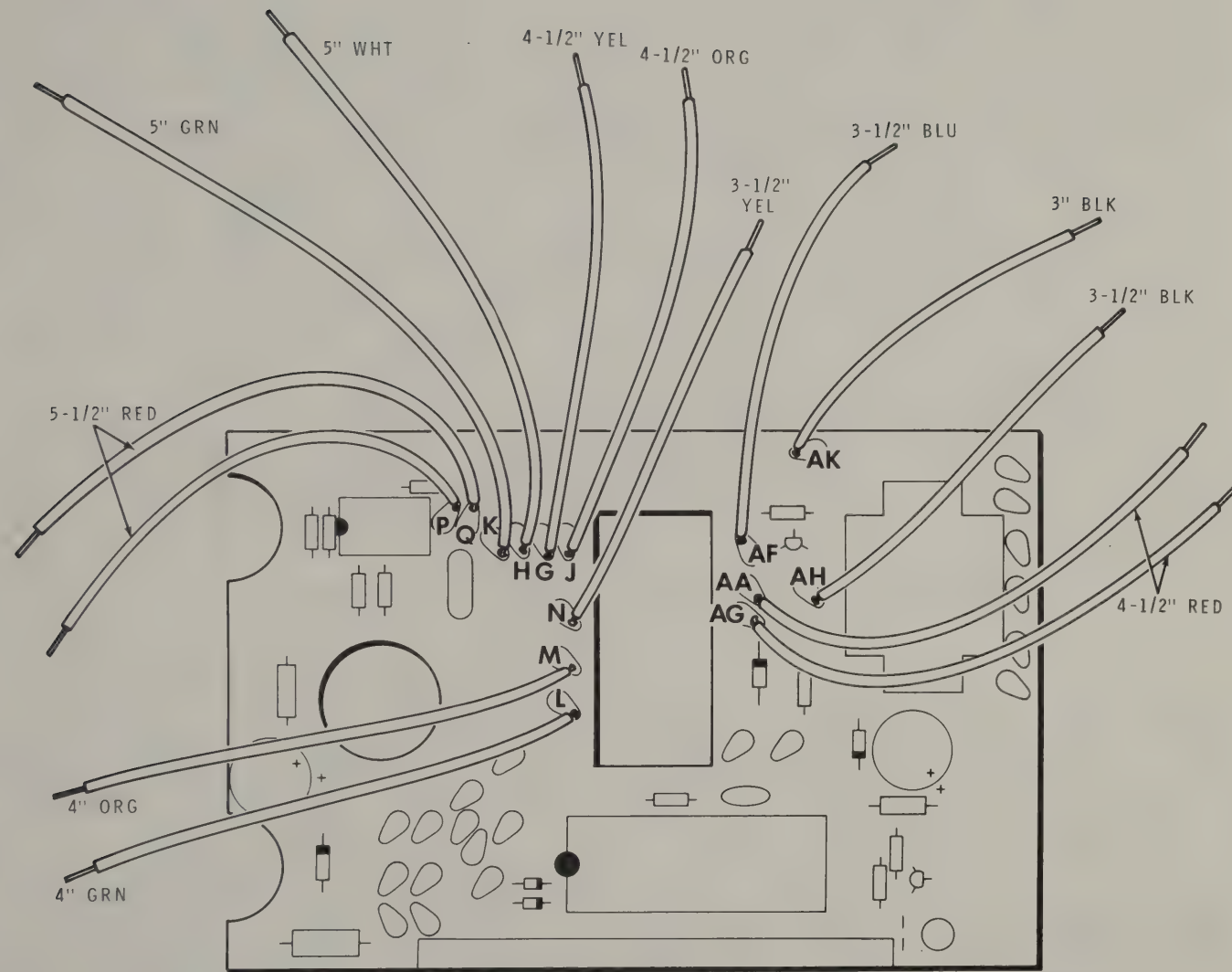
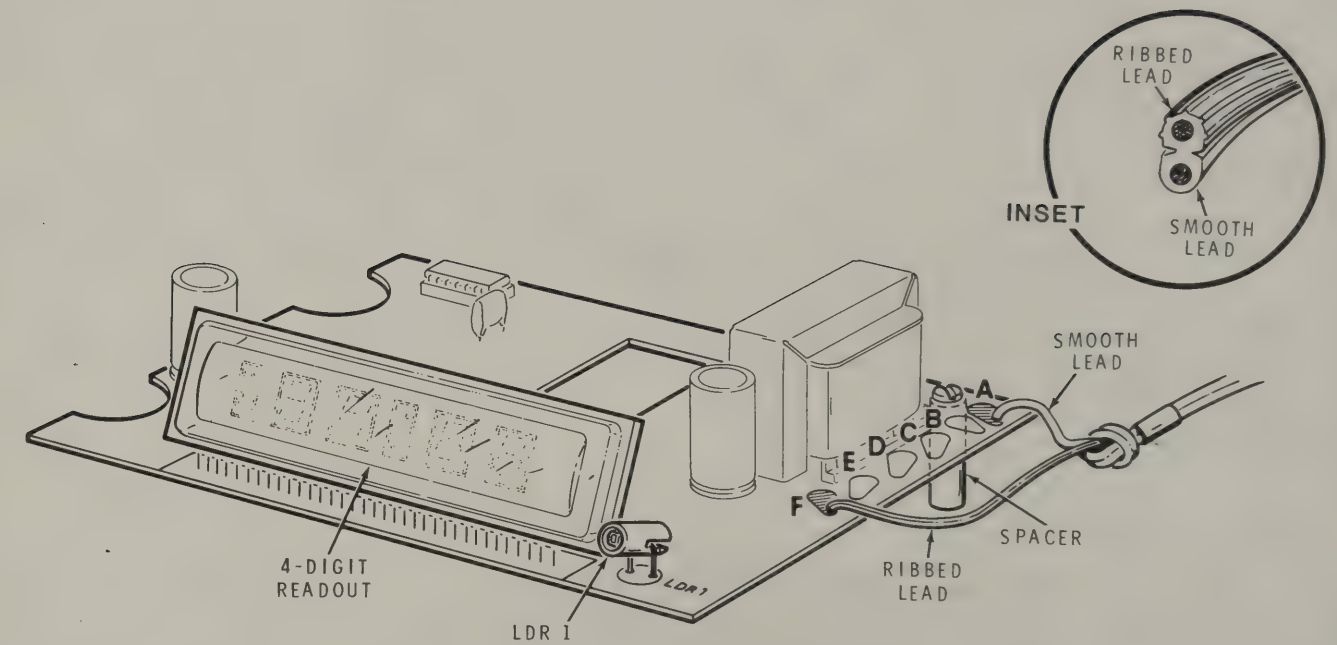


ILLUSTRATION BOOKLET

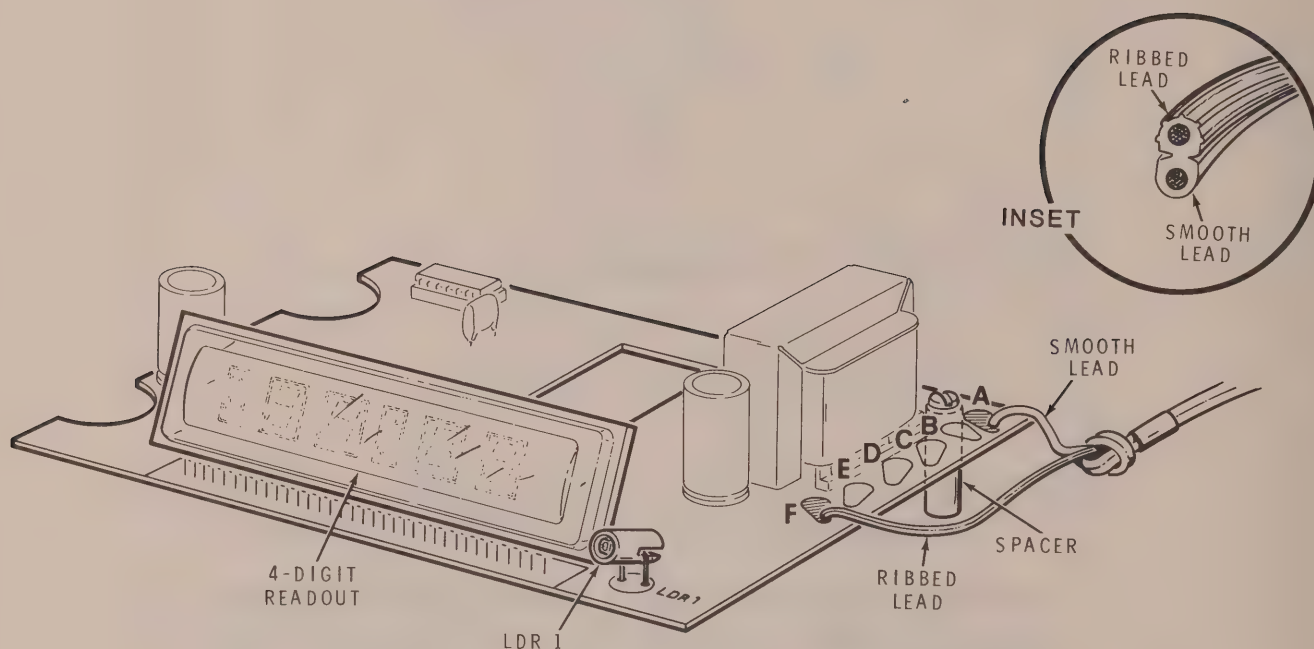
Part of 595-2049-04



PICTORIAL 1-7



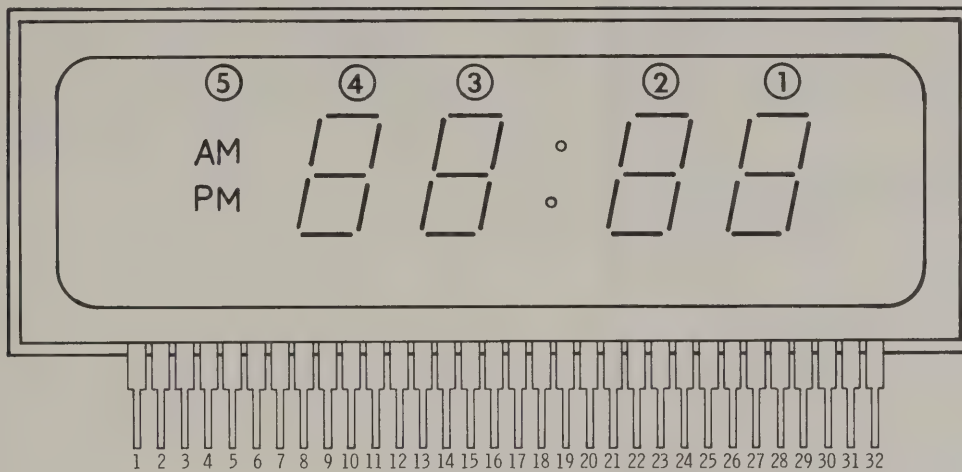
PICTORIAL 1-8



PICTORIAL 1-8

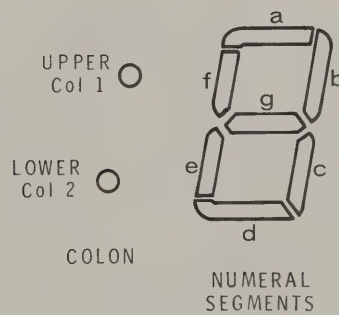
READOUT TUBE

HEATH #411-829, MFR. TYPE 5-LT-02.



PIN CONNECTION (from Left to Right facing display).

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
CONNECTION	F	Col ₁	Col ₂	P	M	A	M	f ₄	g ₄	a ₄	c ₄	b ₄	f ₄	g ₃	a ₃	b ₃	d ₃	c ₃	e ₃	G	f ₂	g ₂	a ₂	b ₂	e ₂	c ₂	f ₁	g ₁	a ₁	b ₁	e ₁	c ₁	d ₁	F

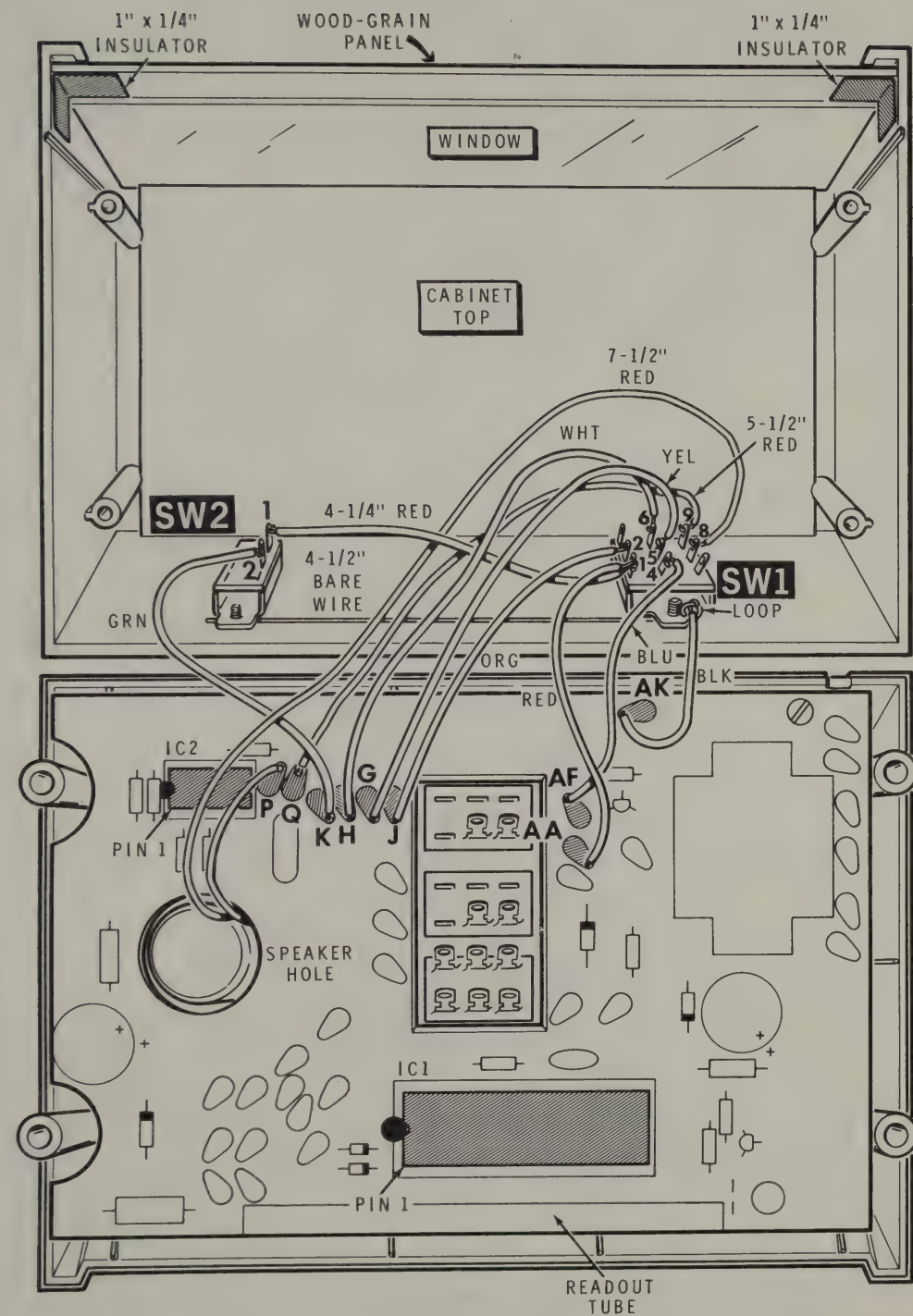


Key: Count DIGIT from right to left. (AM-PM is the fifth digit).

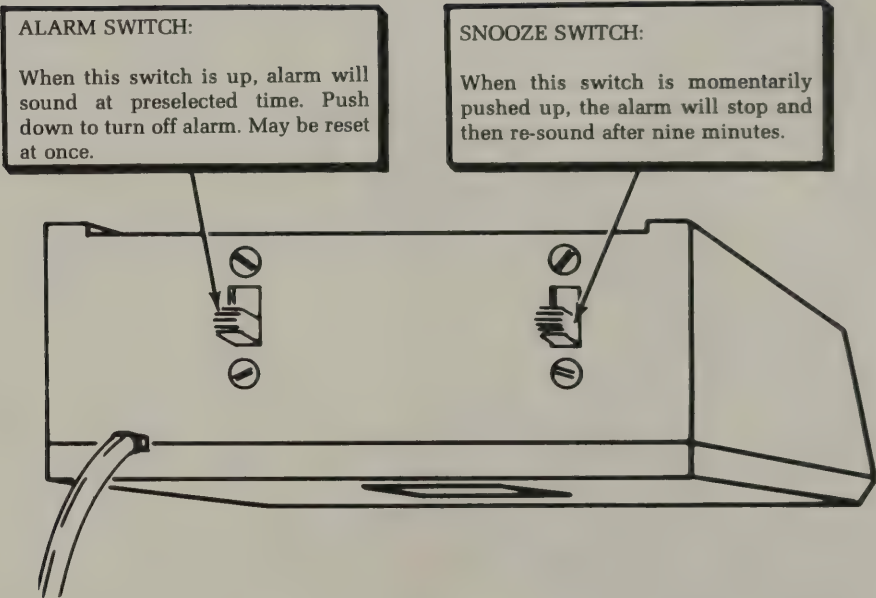
a₃ = "a" segment of third digit.

G = GRID connections.

F = FILAMENT.



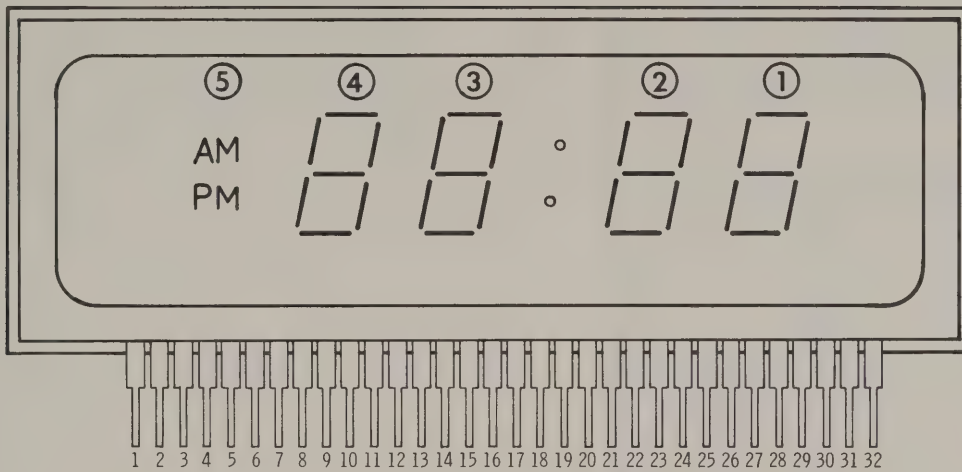
PICTORIAL 2-3



PICTORIAL 5-3

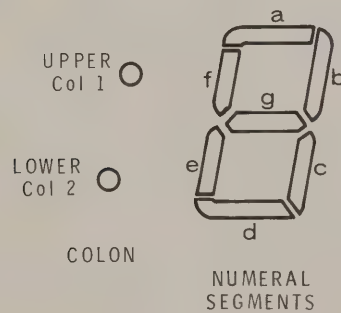
READOUT TUBE

HEATH #411-829, MFR. TYPE 5-LT-02.



PIN CONNECTION (from Left to Right facing display).

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
CONNECTION	F	Col ₁	Col ₂	P	M	A	M	f ₄	g ₄	a ₄	c ₄	b ₄	f ₄	g ₃	a ₃	b ₃	d ₃	c ₃	e ₃	G	f ₂	g ₂	a ₂	b ₂	e ₂	c ₂	f ₁	g ₁	a ₁	b ₁	e ₁	c ₁	d ₁	F



Key: Count DIGIT from right to left. (AM-PM is the fifth digit).

a₃ = "a" segment of third digit.

G = GRID connections.

F = FILAMENT.

YOUR HEATHKIT 90-DAY LIMITED WARRANTY

If you are not satisfied with our service - warranty or otherwise - or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

Our attorney, who happens to be quite a kitbuilder himself, insists that we describe our warranty using all the necessary legal phrases in order to comply with the new warranty regulations. Fine. Here they are:

For a period of ninety (90) days after purchase, Heath Company will replace or repair free of charge any parts that are defective either in materials or workmanship. You can obtain parts directly from Heath Company by writing us at the address below or by telephoning us at (616) 982-3571. And we'll pay shipping charges to get those parts to you — anywhere in the world.

We warrant that during the first ninety (90) days after purchase, our products, when correctly assembled, calibrated, adjusted and used in accordance with our printed instructions, will meet published specifications.

If a defective part or error in design has caused your Heathkit product to malfunction during the warranty period through no fault of yours, we will service it free upon proof of purchase and delivery at your expense to the Heath factory, any Heathkit Electronic Center (units of Schlumberger Products Corporation), or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by the use of corrosive solder, defective tools, incorrect assembly, misuse, fire, or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for customer assembly or set-up time.

This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. **We are not responsible for incidental or consequential damages.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH COMPANY
BENTON HARBOR, MI. 49022

Prices and specifications subject to change without notice.

HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

Kit orders and delivery information (616) 982-3411
Credit (616) 982-3561
Replacement Parts (616) 982-3571

Technical Assistance Phone Numbers

8:00 A.M. to 12 P.M. and 1:00 P.M. to 4:30 P.M., EST, Weekdays Only
R.C. Audio, and Electronic Organs (616) 982-3310
Amateur Radio (616) 982-3296
Test Equipment, Weather Instruments and
Home Clocks (616) 982-3315
Television (616) 982-3307
Aircraft, Marine, Security, Scanners, Automotive,
Appliances and General Products (616) 982-3496
Computers (616) 982-3309

CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. You'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

Please do not send parts for testing, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.

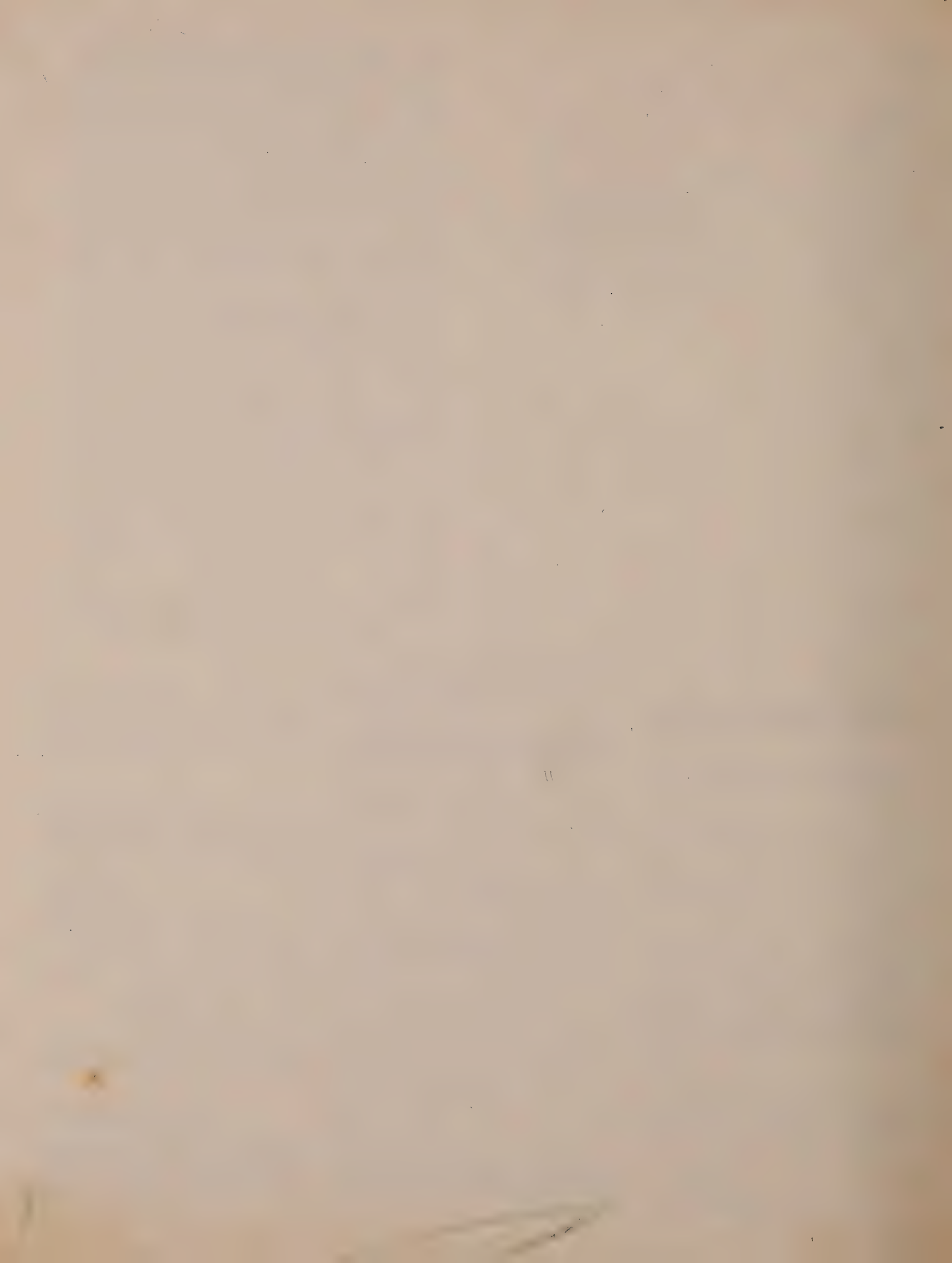
If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least **THREE INCHES** of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022

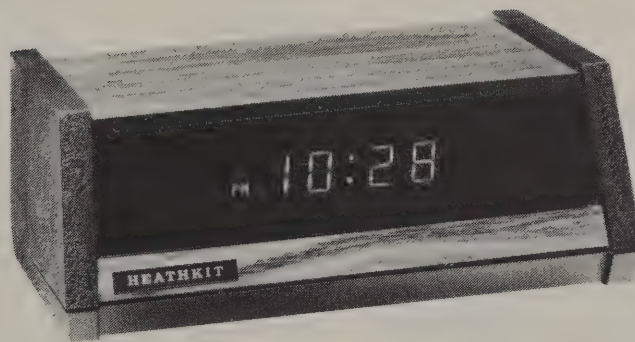


Heathkit® Manual

for the

DIGITAL ALARM CLOCK Model GC-1107

595-2049-04



HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

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INTRODUCTION

The Heathkit Model GC-1107 Digital Alarm Clock has many attractive features, including a wiring option that lets it display either 12-hour or 24-hour time, an AM-PM alarm with a snooze alarm feature, a 4-digit easy-to-read display, a 50 or 60 Hz wiring option, and a 120-volt or 240-volt power option. The heart of the Clock is an MOS/LSI* integrated circuit that performs all the logic functions of keeping time.

A simple wiring option lets your Clock display either 12-hour or 24-hour time. The clock "knows" the difference between AM and PM and will sound the alarm for the one time, either AM or PM, in 24 hours that you desire. The snooze alarm waits approximately nine minutes each time it is reset until the alarm sounds again.

The blue fluorescent readout tubes clearly display the time on a sloped surface, and the 4-digit display will continue to operate if there is any momentary interruption of AC power. This Clock can be wired to operate from either a 50 Hz or 60 Hz power line, 120 or 240-volts AC.

Attractive, modern styling; small size; and solid-state dependability make this clock ideally suited for your office, your home, or almost anywhere.

Refer to the "Kit Builders Guide" for information on parts identification, tools, wiring, and soldering.

*MOS/LSI-Metal Oxide Semiconductor/Large Scale Integration

PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers in the Parts Pictorial. Any part that is packaged in an individual envelope with the part number on it should be placed back in the envelope after you identify it until it is called for in a step.

CAUTION: The integrated circuits (#443-703 and #443-848) can be damaged by static voltage. Do not handle them until you are told to do so.

To order a replacement part, use the Parts Order Form furnished with this kit. For prices refer to the separate "Heath Parts Price List."

Each circuit part in this kit has its own component number (R2, C4, etc.). Use these numbers when you want to identify the same part in the various sections of the Manual. These numbers, which are especially useful if a part has to be replaced, appear:

- In the Parts List,
- At the beginning of each step where a component is installed,
- In some illustrations,
- In the Schematic,
- In the section at the rear of the Manual.

KEY No.	HEATH Part No.	QTY.	DESCRIPTION	CIRCUIT Comp. No.
------------	-------------------	------	-------------	----------------------

RESISTORS

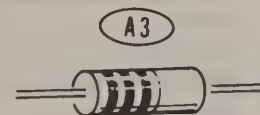
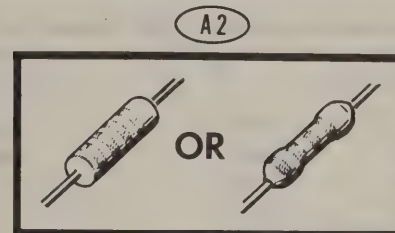
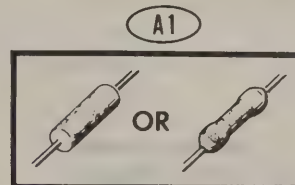
NOTE: The following resistors are 5% tolerance (gold fourth band) unless otherwise noted.

1/4-Watt

A1	6-472-12	1	4700 Ω (yellow-violet-red)	R11
A1	6-682-12	2	6800 Ω (blue-gray-red)	R6, R7
A1	6-103-12	1	10 k Ω (brown-black-orange)	R10
A1	6-273-12	1	27 k Ω (red-violet-orange)	R9
A1	6-473-12	1	47 k Ω (yellow-violet-orange)	R13
A1	6-683-12	1	68 k Ω (blue-gray-orange)	R12
A1	6-104-12	1	100 k Ω (brown-black-yellow)	R4
A1	1-157-12	1	10 M Ω (brown-black-blue)	R3
A1	1-144-12	1	15 M Ω (brown-green-blue)	R2

Other Resistors

A2	6-151	2	150 Ω , 1/2-watt (brown-green-brown)	R1, R8
A3	1-19-1	1	220 Ω , 1-watt (red-red-brown)	R5



KEY No.	HEATH Part No.	QTY.	DESCRIPTION
---------	----------------	------	-------------

CIRCUIT Comp. No.

CAPACITORS

B1	21-143	1	.05 μ F ceramic	C4
B2	25-818	2	500 μ F electrolytic	C1, C2
B3	27-47	1	.1 μ F Mylar*	C3

DIODES

C1	56-56	2	1N4149 diode	D4, D5 (optional)
C1	56-630	1	1N4748A zener	ZD2
C1	57-65	2	1N4002 diode	D1, D3

TRANSISTOR-INTEGRATED CIRCUITS (IC's)

NOTE: Transistors and integrated circuits are marked for identification in one of the following four ways:

1. Part number.
2. Type number. (On integrated circuits this refers only to the numbers; the letters may vary).
3. Part number and type number.
4. Part number with a type number other than the one listed.

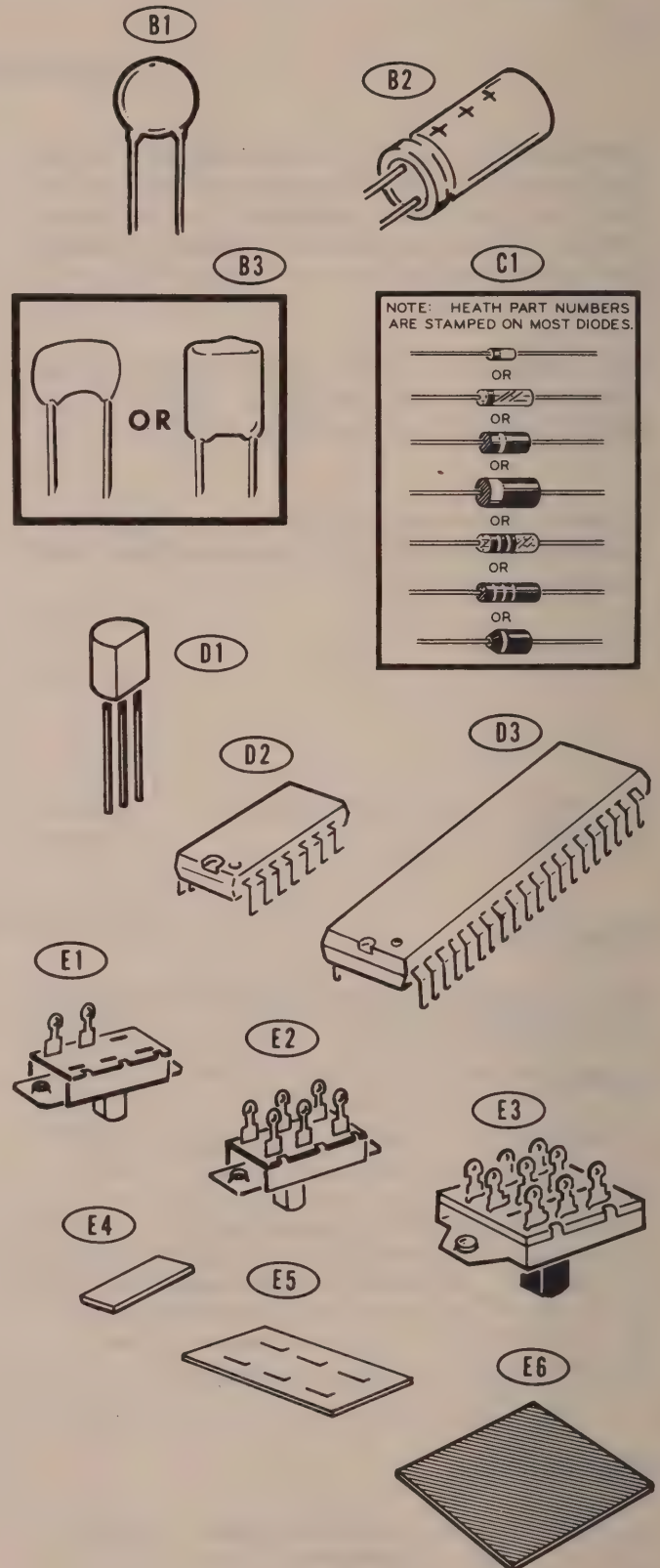
D1	417-801	1	MPSA20 transistor	Q2
D1	417-881	1	MPSA13 transistor	Q1

CAUTION: The integrated circuits (#443-703 and #443-848) can be damaged by static voltage. Do not handle them until you are told to do so.

D2	443-703	1	CD4001 IC	IC2
D3	443-848	1	Clock IC	IC1

SWITCHES-INSULATORS

E1	60-6	3	SPST switch with spring return	SW2, SW4, SW5
E2	60-2	1	DPDT switch	SW3
E3	60-20	1	TPDT switch	SW1
E4	75-138	4	Foot	
E5	75-52	1	Switch insulator	
E6	75-93	1	1" x 1" insulator paper	



NOTE: HEATH PART NUMBERS ARE STAMPED ON MOST DIODES.

KEY	HEATH	QTY.	DESCRIPTION
No.	Part No.		

CIRCUIT
Comp. No.

PLASTIC PARTS

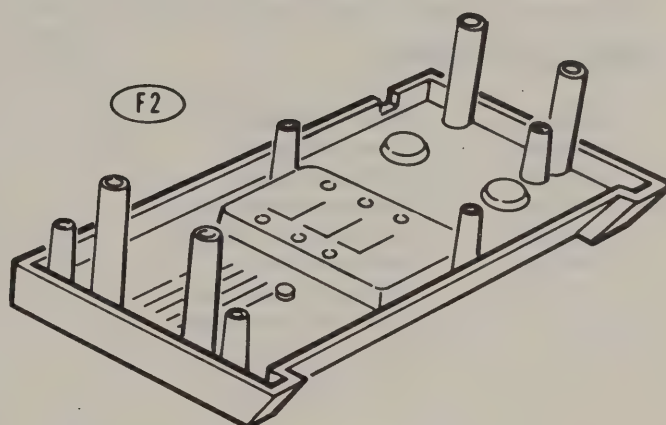
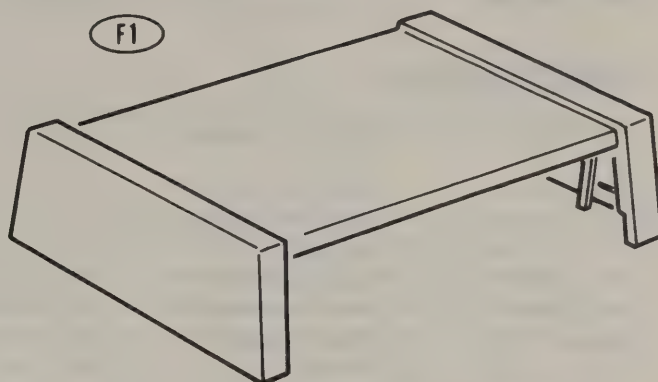
F1	92-77	1	Cabinet top
F2	92-678	1	Cabinet bottom
F3	266-857	1	LDR shield
F4	446-690	1	Readout window

LINE CORD-WIRE-SLEEVING

89-49	1	Line cord
340-2	16"	Bare wire
344-90	7-1/4"	Black wire
344-92	33-1/2"	Red wire
344-93	9-3/4"	Orange wire
344-94	9-3/4"	Yellow wire
344-95	9-3/4"	Green wire
344-96	6"	Blue wire
344-99	5"	White wire
346-67	1/2"	Sleeving

HARDWARE

G1	250-420	6	#2 x 1/4" self-tapping screw
G2	250-235	1	6-32 x 1/4" screw
G3	250-276	10	6-32 x 3/8" black flat head screw
G4	250-1156	4	#6 x 2-1/4" flat head screw
G5	254-1	1	#6 lockwasher
G6	255-83	1	11/16" spacer
G7	258-167	2	Spring clip



G1



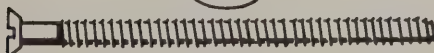
G2



G3



G4



G5



G6



G7



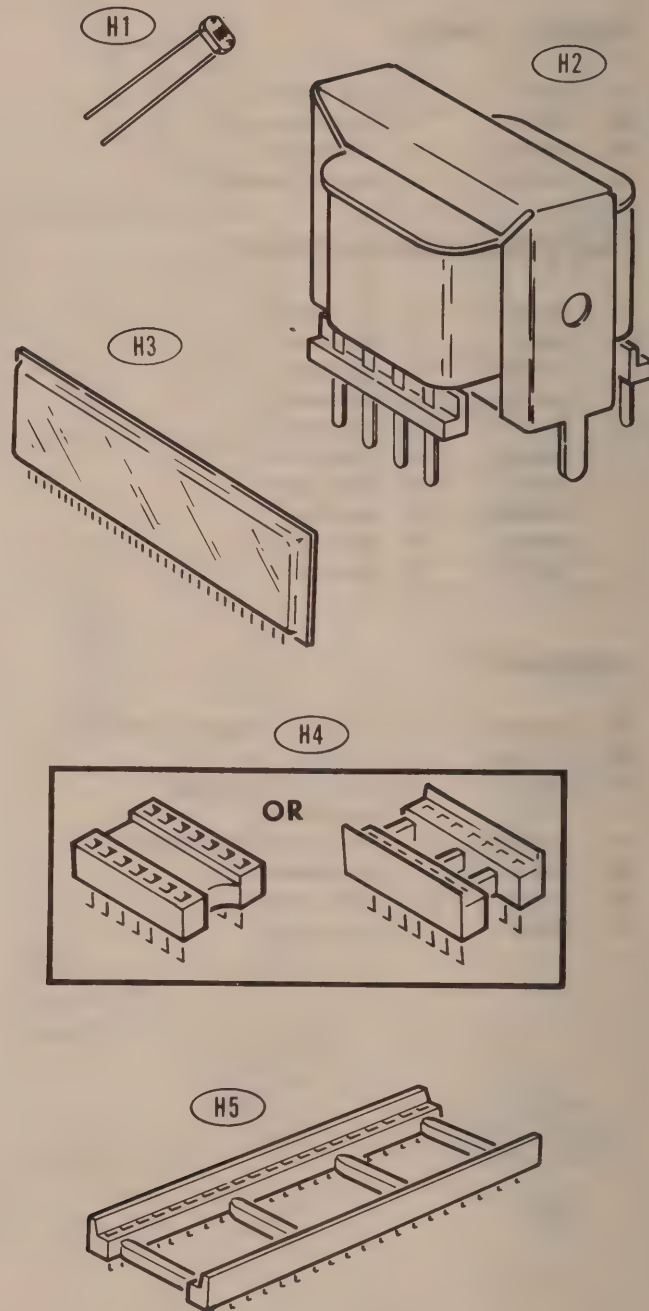
KEY	HEATH	QTY.	DESCRIPTION	CIRCUIT
No.	Part No.			Comp. No.

MISCELLANEOUS

H1	9-67	1	LDR (light dependent resistor)	LDR1
H2	54-949	1	Power transformer	T1
	85-2024-2	1	Printed circuit board	
	401-163	1	Speaker	
H3	411-829	1	4-digit readout tube	
H4	434-298	1	14-pin IC socket	
H5	434-253	1	40-pin IC socket	
			Solder	

PRINTED MATERIAL

390-341	1	"Heathkit" label
390-926	1	"Caution" label
390-995	1	Wood-grain panel (2-piece)
391-34	1	Blue and white label
597-260	1	Parts Order Form
597-308	1	Kit Builders Guide
	1	Assembly Manual (see Page 1 for part number).



STEP-BY-STEP ASSEMBLY

ASSEMBLY NOTES

When you are instructed to mount parts on the printed circuit board, always be sure you have the board positioned as shown in the Pictorial and that each part is the correct one for the step indicated. No special soldering notes will be given for mounting circuit board components; solder each part to the circuit board foil as you install the part on the board. Be especially careful when you solder the integrated circuit sockets and the readout leads to the foil that

you do not create a "solder bridge" to other nearby foils; this would probably cause the Clock not to operate.

When you install parts on the cabinet, do not overtighten the mounting hardware. Thus, you will avoid stripping the mounting stud holes and cracking the plastic parts. Study each drawing carefully and read each step completely before you perform an operation. Then, be sure each part is mounted exactly in the manner shown before you tighten the mounting hardware.

CIRCUIT BOARD ASSEMBLY

START ➔

Position the circuit board as shown. Then proceed with the following steps. Solder each lead or pin to the foil as you mount each component on the board and cut off the excess lead lengths.

(✓) R8: 150 Ω , 1/2-watt (brown-green-brown).

(✓) R5: 220 Ω , 1-watt (red-red-brown).

(✓) R6: 6800 Ω (blue-gray-red).

(✓) R7: 6800 Ω (blue-gray-red).

(✓) R9: 27 k Ω (red-violet-orange).

(✓) R10: 10 k Ω (brown-black-orange).

NOTE: When you install an IC socket, be sure all its pins are inserted through the board before you solder them. Also position the notched end of the socket (if it has a notch) toward the index mark, as indicated on the Pictorial.

(✓) 14-pin IC socket at IC2.

(✓) 40-pin IC socket at IC1.

(✓) R4: 100 k Ω (brown-black-yellow).

(✓) R11: 4700 Ω (yellow-violet-red).

(✓) R3: 10 M Ω (brown-black-blue).

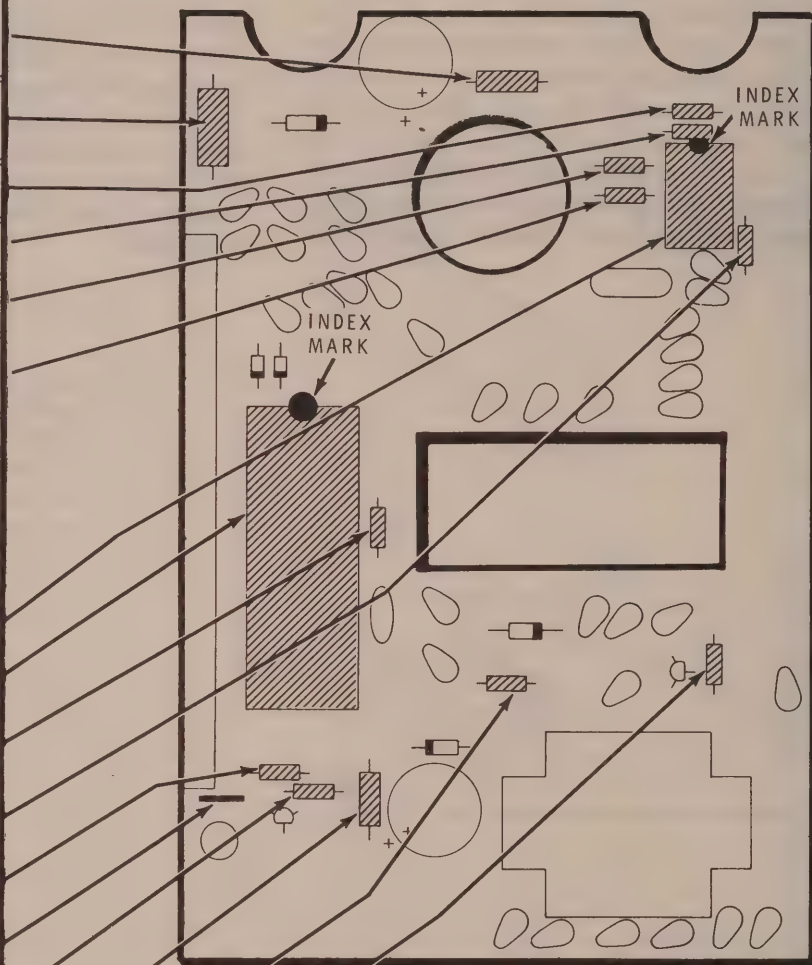
(✓) 3/4" bare wire.

(✓) R2: 15 M Ω (brown-green-blue).

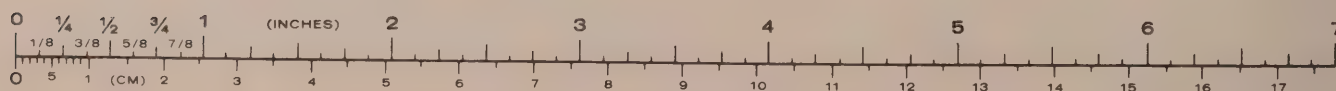
(✓) R1: 150 Ω , 1/2-watt (brown-green-brown).

(✓) R12: 68 k Ω (blue-gray-orange).

(✓) R13: 47 k Ω (yellow-violet-orange).



PICTORIAL 1-1



START

IMPORTANT: Perform the next four steps **only** if you desire a 12-hour Clock display; that is, 01:00 to 12:00 and repeat.

- () 1" bare wire at X-Z.
- () 1" bare wire at U-W.
- () 1" bare wire at R-T.
- () 3/4" bare wire at "D4."

12-HOUR DISPLAY



CONTINUE

NOTE: When the 12-hour option is used, nothing will be installed at "D5," nor at holes S, V, Y, AD, AE, and AJ.

PICTORIAL 1-2

START

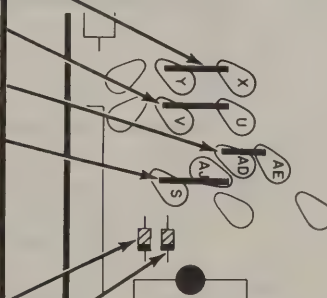
IMPORTANT: Perform the next six steps **only** if you desire a 24-hour display; that is, from 01:00 to 12:00, and then to 13:00, 14:00, etc . . .

- (✓) 3/4" bare wire at X-Y.
- (✓) 3/4" bare wire at U-V.
- (✓) 3/4" bare wire at AE-AD.
- (✓) 3/4" bare wire at AJ-S.

NOTE: Refer to right column Detail 1-3A as you install diodes in the following steps.

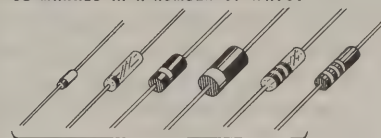
- (✓) D5: 1N4149 diode (#56-56).
- (✓) D4: 1N4149 diode (#56-56).

24-HOUR DISPLAY



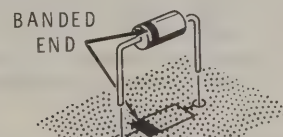
CONTINUE

IMPORTANT: THE BANDED END OF DIODES CAN BE MARKED IN A NUMBER OF WAYS.



BANDED END

NOTE: When you install a diode, always match the banded end of the diode with the band mark on the circuit board.



Detail 1-3A

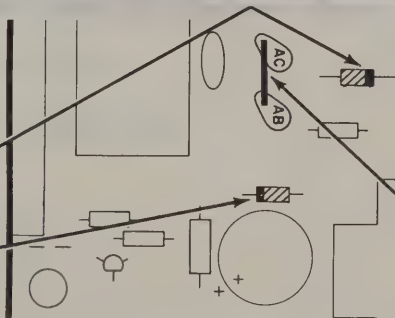
NOTE: Circuit board holes R, T, W, and Z will not be used.

PICTORIAL 1-3

START

Refer to Detail 1-3A (above) as you install diodes in the following steps.

- (✓) ZD2: 1N4748A zener diode (#56-630).
- (✓) D1: 1N4002 diode (#57-65).



CONTINUE

IMPORTANT: Perform the following step **only** if your utility power is 50 Hz AC. Disregard this step if your power is 60 Hz AC.

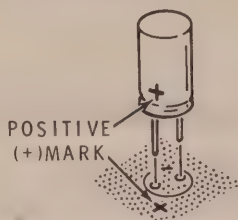
- () 1" bare wire at AB-AC.

PICTORIAL 1-4

START →

- (✓) D3: 1N4002 diode (#57-65). Be sure to position the banded end as shown.

NOTE: When you install a vertical electrolytic capacitor, be sure you match the positive (+) mark on the capacitor with the positive (+) mark on the circuit board.

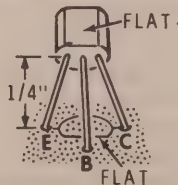


- (✓) C2: 500 μ F electrolytic.

- (✓) C3: .1 μ F Mylar.

- (✓) C4: .05 μ F ceramic.

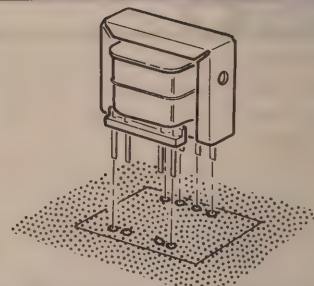
NOTE: In each of the following steps, where a transistor is installed, line up the flat on the transistor with the flat on the circuit board and insert the transistor leads into the corresponding E, B, and C holes in the circuit board. Solder each transistor as it is installed and cut off the excess lead lengths.



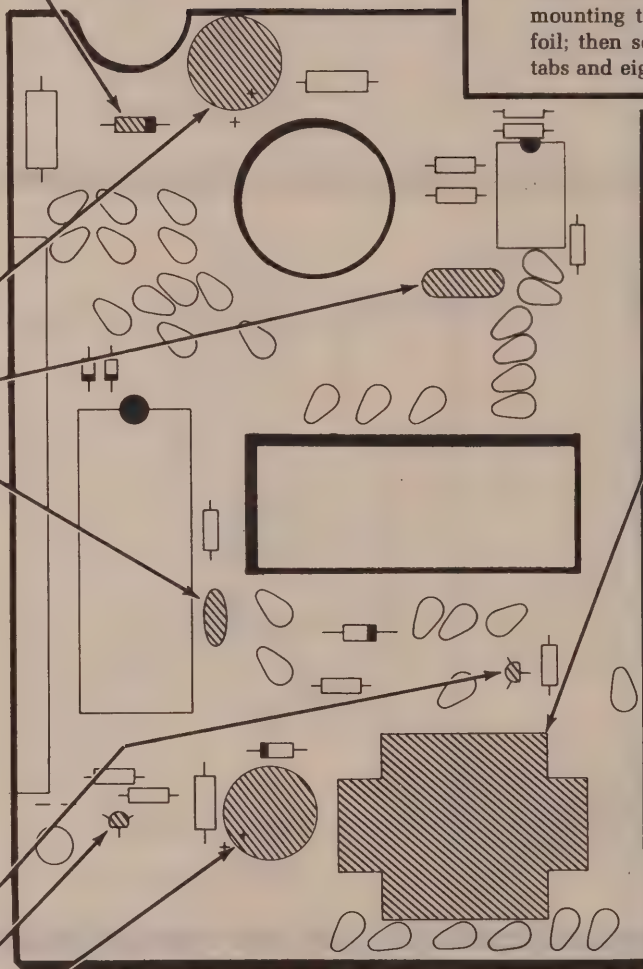
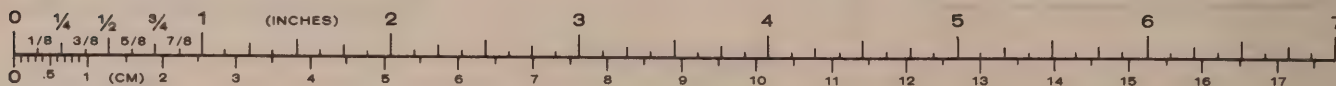
- (✓) Q2: MPSA20 (#417-801).

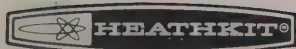
- (✓) Q1: MPSA13 (#417-881).

- (✓) C1: 500 μ F electrolytic. Be sure to position the positive marks correctly.

CONTINUE →

- (✓) T1: Mount the power transformer as shown. Bend the two mounting tabs down onto the foil; then solder the mounting tabs and eight lugs to the foil.

**PICTORIAL 1-5**



Refer to Pictorial 1-7 (Illustration Booklet, Page 1) for the following steps.

Position the circuit board as shown in the Pictorial; then proceed with the following steps.

NOTE: To prepare stranded wires, as in the following step, cut each wire to the length indicated and remove 1/4" of insulation from each end. Then tightly twist each bare wire end and add a small amount of solder to hold the fine strands together.

(✓) Prepare the following wires:

5-1/2" red	3-1/2" blue
5-1/2" red	5" white
5" green	4-1/2" yellow
4" green	

Install one end of each wire in a circuit board hole as directed in the following steps. Solder the wire end to the foil and cut off the excess wire. The free wire ends will be connected later.

(✓) 5-1/2" red wire to hole P.

(✓) 5-1/2" red wire to hole Q.

(✓) 5" green wire to hole K.

(✓) 4" green wire to hole L.

(✓) 3-1/2" blue wire to hole AF.

(✓) 5" white wire to hole H.

(✓) 4-1/2" yellow wire to hole G.

() Prepare the following wires:

3-1/2" yellow	3-1/2" black
4-1/2" orange	4-1/2" red
4" orange	4-1/2" red
3" black	

Install these wires on the circuit board as directed in the following steps.

(✓) 3-1/2" yellow wire to hole N.

(✓) 4-1/2" orange wire to hole J.

(✓) 4" orange wire to hole M.

(✓) 3" black wire to hole AK.

(✓) 3-1/2" black wire to hole AH.

(✓) 4-1/2" red wire to hole AG.

(✓) 4-1/2" red wire to hole AA.

Refer to Pictorial 1-8 (Illustration Booklet, Page 1) for the following steps.

() Refer to Part A of Detail 1-8A and push the leads of the LDR all the way into the LDR shield as shown.

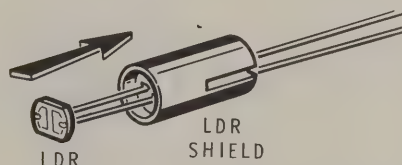
() LDR1: Bend the leads of the LDR in the slots of the LDR as shown in Part B of Detail 1-8A. Then push the leads of the LDR into the circuit board at LDR1 until the LDR shield is 1/4" above the circuit board. Solder the leads to the foil and cut off the excess lead lengths.

(✓) On the top of the circuit board, form the leads of the LDR so the shield and LDR are at an angle of approximately 45 degrees to the surface of the board, as shown in the Pictorial.

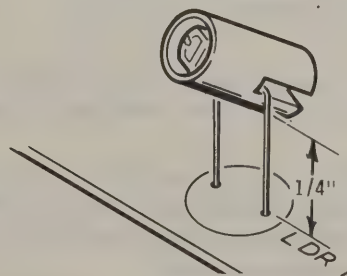
(✓) Cut the bare wire ends from the end of the line cord. Separate the line cord end for a length of 2".

(✓) Cut 1" from each of the line cord wires. Save these 1" wires for the following steps.

PART A



PART B



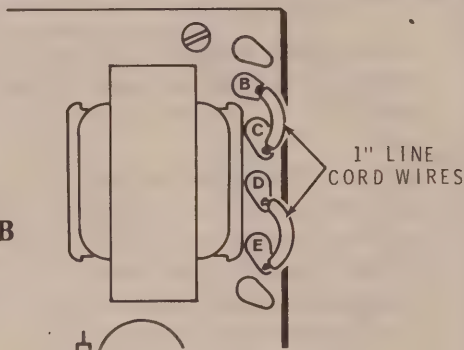
Detail 1-8A

ALTERNATE LINE VOLTAGE WIRING

NOTE: Two sets of line voltage wiring instructions are given below, one for 120 VAC line voltage and the other for 240 VAC line voltage. In the U.S.A., 120 VAC is most often used, while elsewhere 240 VAC is more common. **USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.**

120 VAC WIRING

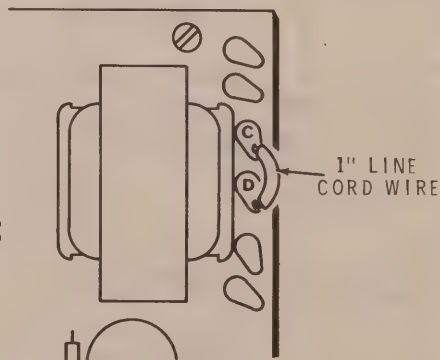
Detail 1-8B



- (✓) Prepare both ends of the two 1" pieces of line cord wire.
- (✓) Refer to Detail 1-8B and install a 1" line cord wire on the circuit board from hole B to hole C. Solder both circuit board foil connections and cut off the excess wire ends.
- (✓) In the same manner, install a 1" line cord wire from hole D to hole E.

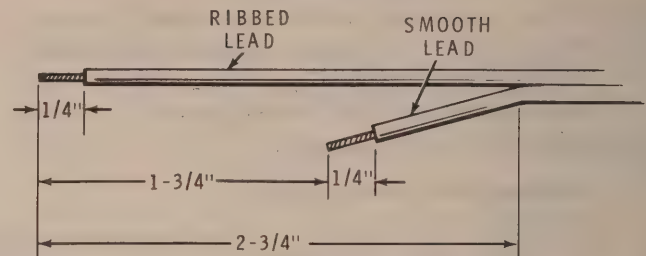
240 VAC WIRING

Detail 1-8C

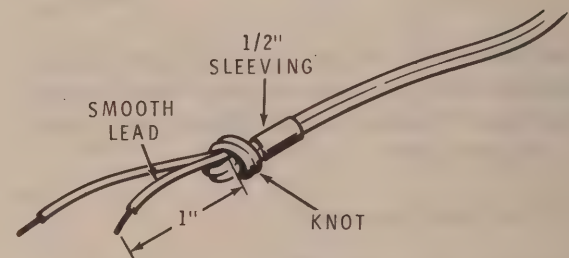


- () Prepare both ends of one 1" piece of line cord wire. You may discard the remaining 1" piece.
- () Refer to Detail 1-8C and install a 1" line cord wire on the circuit board from hole C to hole D. Solder both circuit board foil connections and cut off the excess wire ends.

PART A



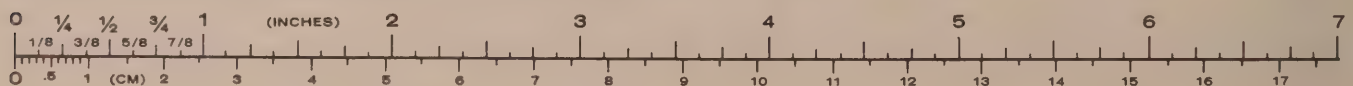
PART B

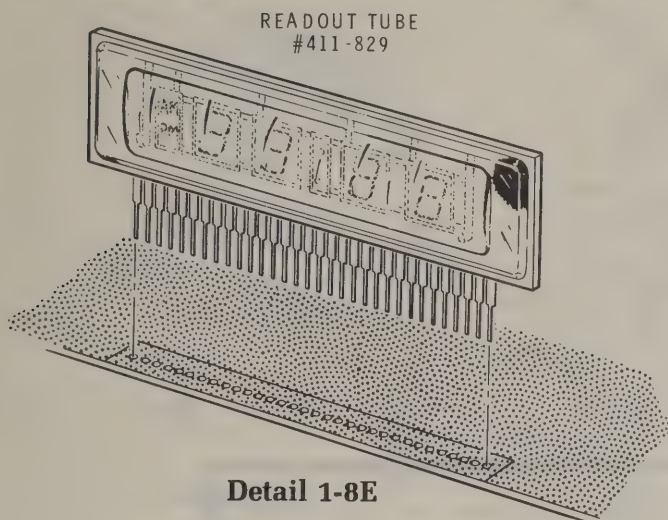


Detail 1-8D

Refer to the inset drawing on Pictorial 1-8 and identify the line cord ribbed and smooth leads.

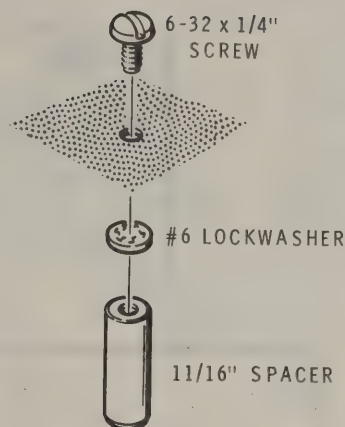
- (✓) Refer to Part A of Detail 1-8D and cut and prepare the end of the line cord as shown. Tightly twist the bare wire ends and add a small amount of solder to hold the fine strands together.
- (✓) Refer to Part B of Detail 1-8D and slide the 1/2" of sleeving over the ends of the line cord and up onto the cord approximately 4". Tie an overhand knot in the line cord 1" above the smooth-lead wire end as shown. Slide the sleeving down against the knot.
- (✓) Connect the ribbed lead to circuit board hole F and connect the smooth lead to hole A. Solder both leads to the foil and cut off the excess lead ends.





Detail 1-8E

- (✓) Locate the 4-digit readout tube (#411-829). Check to be sure all its pins are straight.
- (✓) Refer to Detail 1-8E and mount the readout tube onto the circuit board in the manner shown. Be sure all the pins are through the board and that the tube is fully seated on the component side. Carefully solder the tube pins to the foil and cut off the excess pin ends.



Detail 1-8F

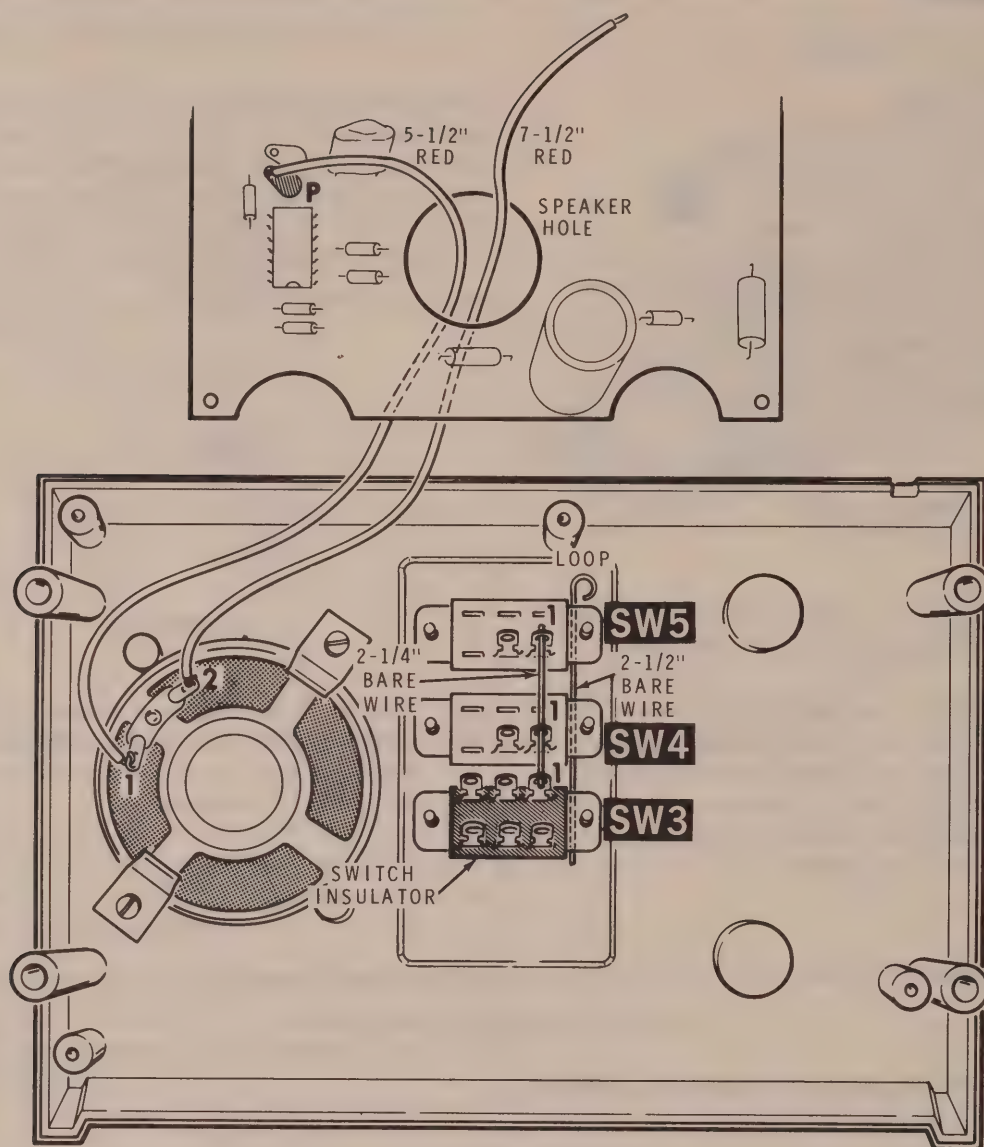
- () Refer to Detail 1-8F and mount a 11/16" spacer on the circuit board at the upper right corner as shown in the Pictorial. Use a 6-32 x 1/4" screw and a #6 lockwasher.

CIRCUIT BOARD CHECKOUT

Carefully inspect the circuit board for the following conditions.

NOTES:

- () Unsoldered connections or pins.
 - () Poor solder connections.
 - () Solder bridges between foil patterns.
 - () Protruding leads which could touch together.
 - () Transistors for proper installation.
 - () Electrolytic capacitors for the correct position of the positive (+) marking.
 - () Diodes for the correct position of the banded ends.
1. If you elected the 12-hour option, you will have two 1N4149 (#56-56) diodes left over. These may be discarded.
 2. There are a number of unused holes in the circuit board; you may wish to recheck the 12- and 24-hour option steps to make sure the correct holes have been used. Also note that holes AB and AC will be unused if your power is 60 Hz AC.



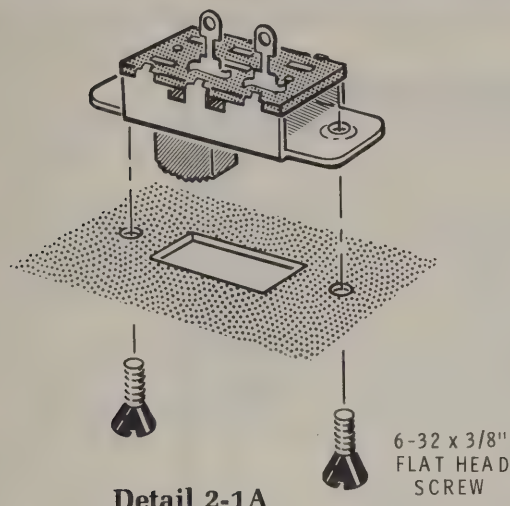
PICTORIAL 2-1

CABINET ASSEMBLY

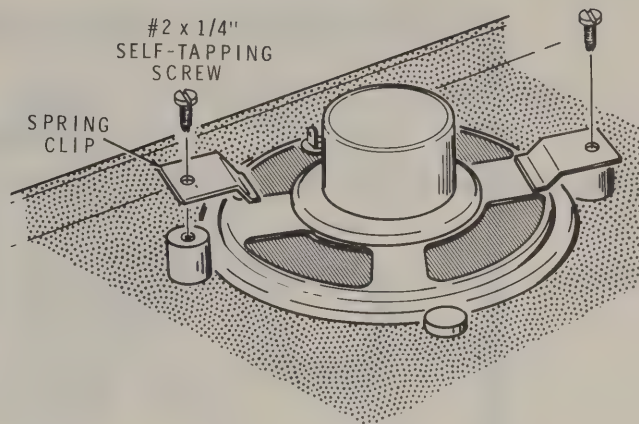
Refer to Pictorial 2-1 for the following steps.

NOTE: It is suggested that you place a soft cloth on your work area as you perform the following steps to avoid scratching your Clock cabinet parts.

- () Position the cabinet bottom on your work area as shown in the Pictorial.
- () SW5: Refer to Detail 2-1A and loosely mount an SPST switch with spring return (#60-6) at SW5. Use two 6-32 \times 3/8" flat head screws. Be sure to position the switch lugs as shown in the Pictorial.
- () SW4: In the same manner, loosely mount another SPST switch with spring return at SW4.
- () SW3: Loosely mount a DPDT switch (#60-2) at SW3 with two 6-32 flat head screws.
- () Cut a 2-1/2" piece of bare wire. Form a small loop in one end of the wire.
- () Refer to Pictorial 2-1 and pass the end of the wire under the indicated ends of switches SW5, SW4, and SW3 as shown.
- () Tighten the six screws on the three switches.



Detail 2-1A



Detail 2-1B

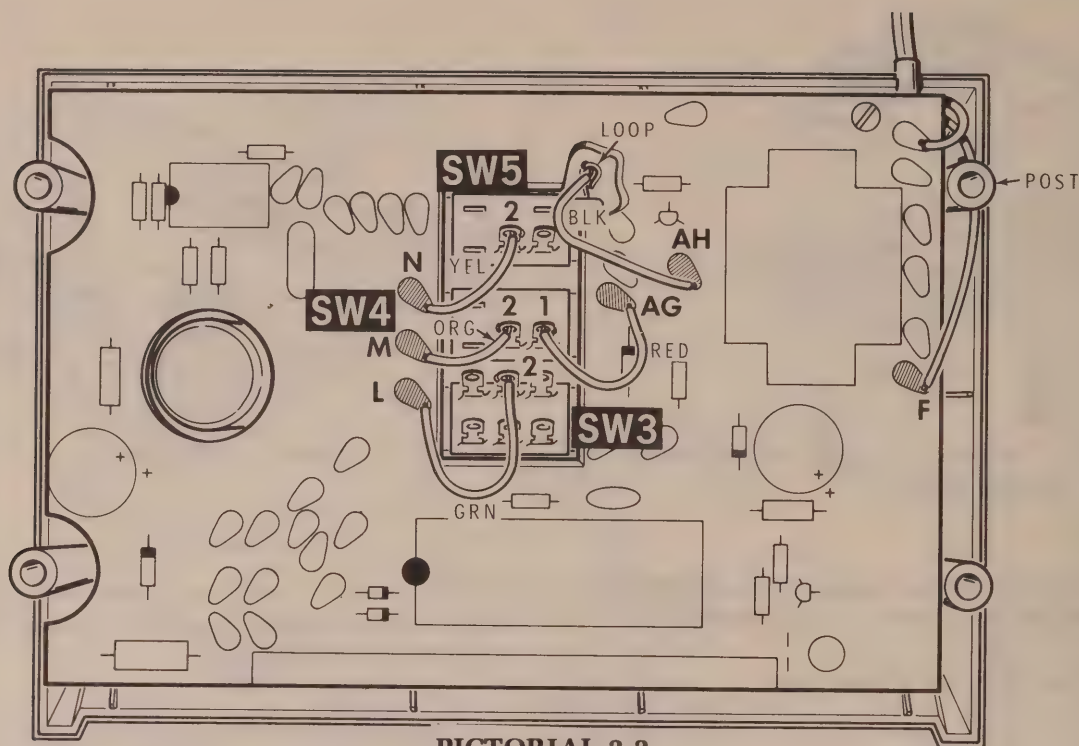
- () Place the switch insulator down over the lugs of switch SW3 as shown in the Pictorial.
- () Cut a 2-1/4" piece of bare wire.

NOTES:

1. In the following steps, (NS) means not to solder the connections because other wires will be added later. (S-) with a number, such as (S-3), means to solder the connection. The number tells how many wires are at the connection.
 2. Where a wire passes through a connection and then goes to another point, as in the next step, it will count as two wires in the solder instructions (S-2), one entering and one leaving the connection. Be especially careful when soldering these connections, to apply enough solder and heat to solder these "through wires."
 3. On DPDT switch SW3, you will not use switch lugs 4, 5, and 6 — nearest you in Pictorial 2-1.
- () Pass the end of the 2-1/4" bare wire into SW5 lug 1 (S-1), through SW4 lug 1 (NS), and into SW3 lug 1 (S-1). Cut off any excess wire ends on SW3 and SW5.

NOTE: As you install the speaker in the following step, be sure to handle it carefully to avoid damage to the speaker cone.

- (✓) Place the speaker into the cabinet bottom with its lugs positioned as shown in the Pictorial.
- (✓) Refer to Detail 2-1B and secure the speaker to the cabinet with two #2 × 1/4" self-tapping screws and two spring clips as shown. Perform this step carefully with a small screwdriver to avoid damage to the speaker cone.
- (✓) On the circuit board, locate the 5-1/2" red wire coming from P. Pass this wire down through the round (speaker) hole as shown in Pictorial 2-1. Secure this wire to speaker lug 1 (S-1).
- () Prepare a 7-1/2" red wire.
- () Connect one end of the 7-1/2" red wire to speaker lug 2 (S-1). Pass the other end through the round speaker hole as shown in Pictorial 2-1. You will connect it later.



PICTORIAL 2-2

Refer to Pictorial 2-2 for the following steps.

- (✓) Locate the black wire coming from AH. Pass the free end of this wire through the rectangular opening in the circuit board and connect it to the bare wire loop at SW5 as shown in the Pictorial (S-1).
- (✓) Position the circuit board down into the bottom of the cabinet as shown in the Pictorial. Do not secure the circuit board to the cabinet bottom at this time. Position the line cord wire from F outside the cabinet post as shown.

NOTE: The wires that connect between the circuit board and components mounted on the cabinet are long enough to permit you to temporarily raise the circuit board away from the cabinet, if necessary, without unsoldering any of the connections.

Connect the wires coming from the circuit board to the three cabinet switches as directed in the following steps.

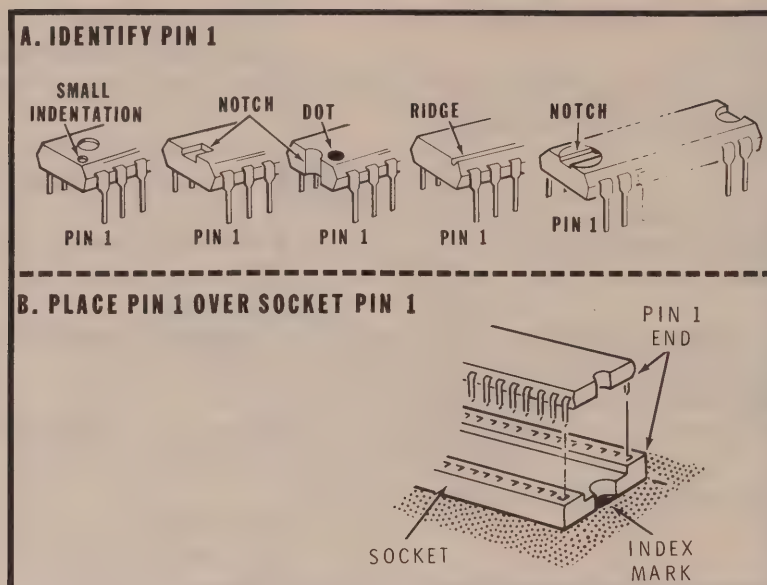
- (✓) Green wire coming from L to SW3 lug 2 (S-1).
- (✓) Orange wire coming from M to SW4 lug 2 (S-1).
- (✓) Yellow wire coming from N to SW5 lug 2 (S-1).
- (✓) Red wire coming from AG to SW4 lug 1 (S-3).

Set the cabinet bottom-circuit board assembly aside temporarily.

Refer to Pictorial 2-3 (Illustration Booklet, Page 2) for the following steps.

- (✓) Position the cabinet top on your work area as shown in the Pictorial.
- (✓) SW1: Loosely mount the TPDT switch (#60-20) into the cabinet top as shown. Use two 6-32 × 3/8" flat head screws.
- (✓) SW2: Similarly, mount the remaining SPST switch with spring return at SW2 with 6-32 × 3/8" flat head screws. NOTE: Be sure to position the switch lugs as shown in the Pictorial.
- (✓) Cut a 5" piece of bare wire. Form a small loop in one end of the wire.
- (✓) Pass the end of the bare wire under switch SW1 and across to SW2. Position the wire close against the shanks of the nearer two screws on SW1 and SW2; then tighten all four switch mounting screws.
- (✓) Cut and prepare a 4-1/4" red wire. Connect the red wire from SW2 lug 1 (S-1) to SW1 lug 1 (NS).
- (✓) Position the cabinet top close to the back of the cabinet bottom.
- (✓) Connect the black wire coming from circuit board callout AK to the bare wire loop at SW1 (S-1).
- (✓) Connect the end of the green wire coming from K to switch SW2 lug 2 (S-1).
- (✓) Connect the red wire coming from AA to switch SW1 lug 1 (S-2).
- (✓) Connect the blue wire coming from AF to SW1 lug 4 (S-1).
- (✓) Connect the orange wire coming from J to SW1 lug 2 (S-1).
- (✓) Connect the yellow wire coming from G to SW1 lug 5 (S-1).
- (✓) Connect the white wire coming from H to SW1 lug 6 (S-1).
- (✓) Connect the free end of the 7-1/2" red wire coming from the round speaker hole to switch SW1 lug 8 (S-1).
- (✓) Connect the 5-1/2" red wire coming from circuit board hole Q to switch SW1 lug 9 (S-1).
- (✓) Check the switch and make sure none of the lugs are shorted together.



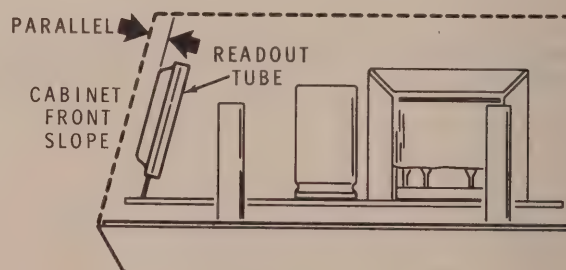


Detail 2-3A

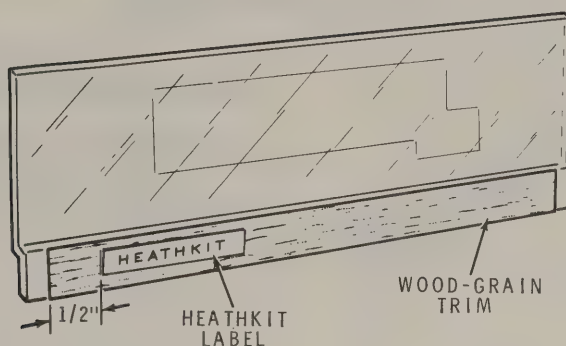
NOTE: The integrated circuits (IC's) that you will install in the next two steps are rugged and reliable components. However, normal static electricity discharged from your body, through an integrated circuit pin to an object, can damage the integrated circuits. Read the instructions first. Then carefully perform each step as follows, without interruption.

1. Remove the IC from its package, with both hands.
2. Hold the IC in one hand, remove the conductive foam, and straighten any bent pins with the other hand.
3. Continue holding the IC, being careful not to touch it to anything, while you pick up and hold the circuit board in your other hand.
4. Align the pin 1 end of the IC with socket pin 1. See Detail 2-3A. Carefully start the IC pins into the sockets; then push the IC down into the sockets. Once the IC's are inserted into the sockets they are protected against static electricity.
5. Be sure each IC is fully seated in its socket. Be sure no pins have folded flat against the underside of the IC. Be sure each pin is in the proper socket hole.

- (✓) IC1: Install the clock IC (#443-848) at IC1.
- (✓) IC2: Install the CD4001 IC (#443-703) at IC2.
- (✓) Check the front (sloped) edge of the cabinet top and bend the readout tube rearward at the top to the same slope on the cabinet. Refer to Detail 2-3B.



Detail 2-3B



Detail 2-3C

- (✓) Tip the cabinet top rearward until it rests on its top side as shown.

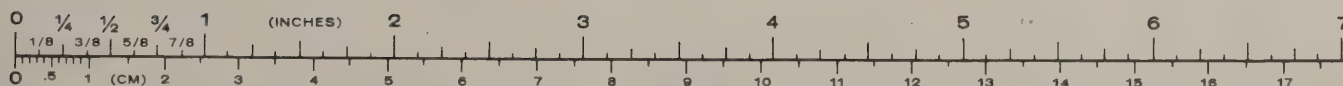
NOTE: In the following steps you will work on and install the cabinet window. If you wish at this time, you may wash the window in a warm, mild detergent solution and dry it with a soft cloth. Thereafter, try to handle the window only by its edges to avoid finger smudges.

Refer to Detail 2-3C for the next four steps.

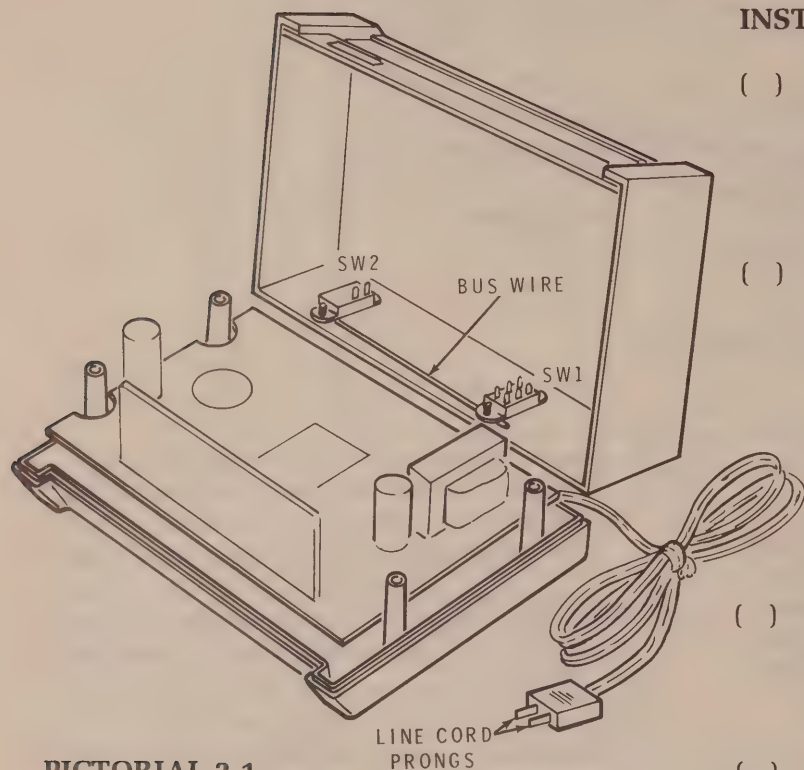
- (✓) 1. Position the window on a soft cloth on your work area as shown. Be sure the narrow flange on the lower edge is facing upward.
- (✓) 2. Locate the wood-grain panel and peel off the narrow (approximately $1/2" \times 6-1/2"$) strip.
- (✓) 3. Carefully position the narrow wood-grain strip onto the lower window flange so the ends of the strip are equally distant from the edges of the window. When you are sure the strip is centered top to bottom and end to end on the flange, press the strip down firmly along its length.

- (✓) 4. Remove the paper backing from the "Heathkit" label. Center the label, from top to bottom, on the wood-grain window strip, $1/2"$ from the left edge of the window as shown.
- (✓) Refer to Pictorial 2-3 and slide the window down into the window cutout in the cabinet top as shown.
- (✓) Locate the $1" \times 1"$ paper insulator. From the insulator cut two $1" \times 1/4"$ pieces. Discard the $1" \times 1/2"$ piece.
- (✓) Remove the paper backing from a $1" \times 1/4"$ piece of insulator. Fold this piece in the center so it forms a right angle; then press the insulator into the left corner of the cabinet top and against the window as shown in Pictorial 2-3.
- (✓) In the same manner, install the other $1" \times 1/4"$ piece of insulator in the right corner of the cabinet top and window.

This completes the step-by-step assembly of your Digital Alarm Clock, except for "Final Assembly." Proceed to the following "Initial Tests."



INITIAL TESTS



PICTORIAL 3-1

Refer to Pictorial 3-1 for the following steps.

NOTES:

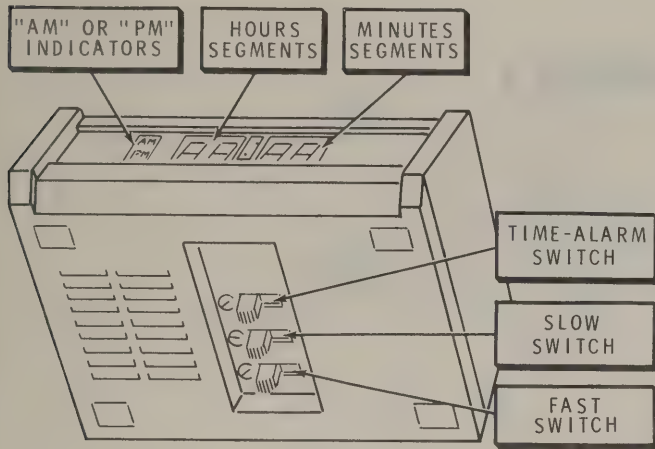
1. Do not plug your Digital Alarm Clock into an AC outlet until you are instructed to do so.
2. If, during the following tests, you fail to obtain the indicated results, refer to the "In Case of Difficulty" section on Page 26.
3. If you have an ohmmeter, perform the steps under "Instrument Tests" in the following section. If you do not have an ohmmeter, proceed directly to "Operational Tests."

INSTRUMENT TESTS

- () Position your Digital Clock on your work area as shown. Set the cabinet top to the rear so it is resting on the back and so the switches are accessible from the inside. Position the circuit board into the cabinet bottom as shown.
- () Connect the ohmmeter common (ground) lead to the bus wire between rear panel switches SW1 and SW2.
- () With the positive ohmmeter lead, measure the resistance first to one line cord prong and then to the other prong. In both cases the reading should be infinity.
- () Connect the common ohmmeter lead to one line cord prong and the positive lead to the other prong. You should get some reading near 200 ohms. If the reading is at or near zero, refer to the "In Case of Difficulty" section of the Manual.

OPERATIONAL TESTS

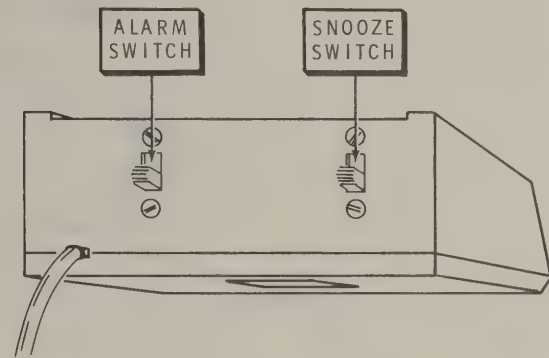
- () Be sure the LDR is still positioned at approximately 45 degrees to the surface of the circuit board, and that the readout tube is slanted slightly rearward.
- () Temporarily position the cabinet top down onto the cabinet bottom.



PICTORIAL 3-2

Refer to Pictorials 3-1, 3-2, and 3-3 as you make the following checks.

- () Plug the line cord into an AC outlet. Since the Clock has no on-off switch, the readout tube should come on.
- () If you assembled your Clock for 12-hour time, the "AM" or the "PM" indicator should blink slowly on and off. If your Clock is to indicate 24-hour time, the left digit of the hours clock segment should blink.
- () Push the ALARM switch down.
- () On the cabinet bottom, briefly push the FAST switch and release it; the blinking indicator on the readout tube should now be steadily lit.
- () On the bottom of the cabinet, push the TIME-ALARM switch to the TIME position.
- () Push and hold the FAST switch slide. The Clock readout should cycle rapidly through a full 12 or 24-hour cycle, and the "AM" and "PM" indicators should change at 12-hour intervals if your clock is wired for a 12-hour indication. Release the FAST switch.
- () Note the time indicated on the Clock.
- () Push the TIME-ALARM switch to ALARM.
- () Push the FAST switch until the readout indicates one hour **earlier** than the time noted above. Release the FAST switch.

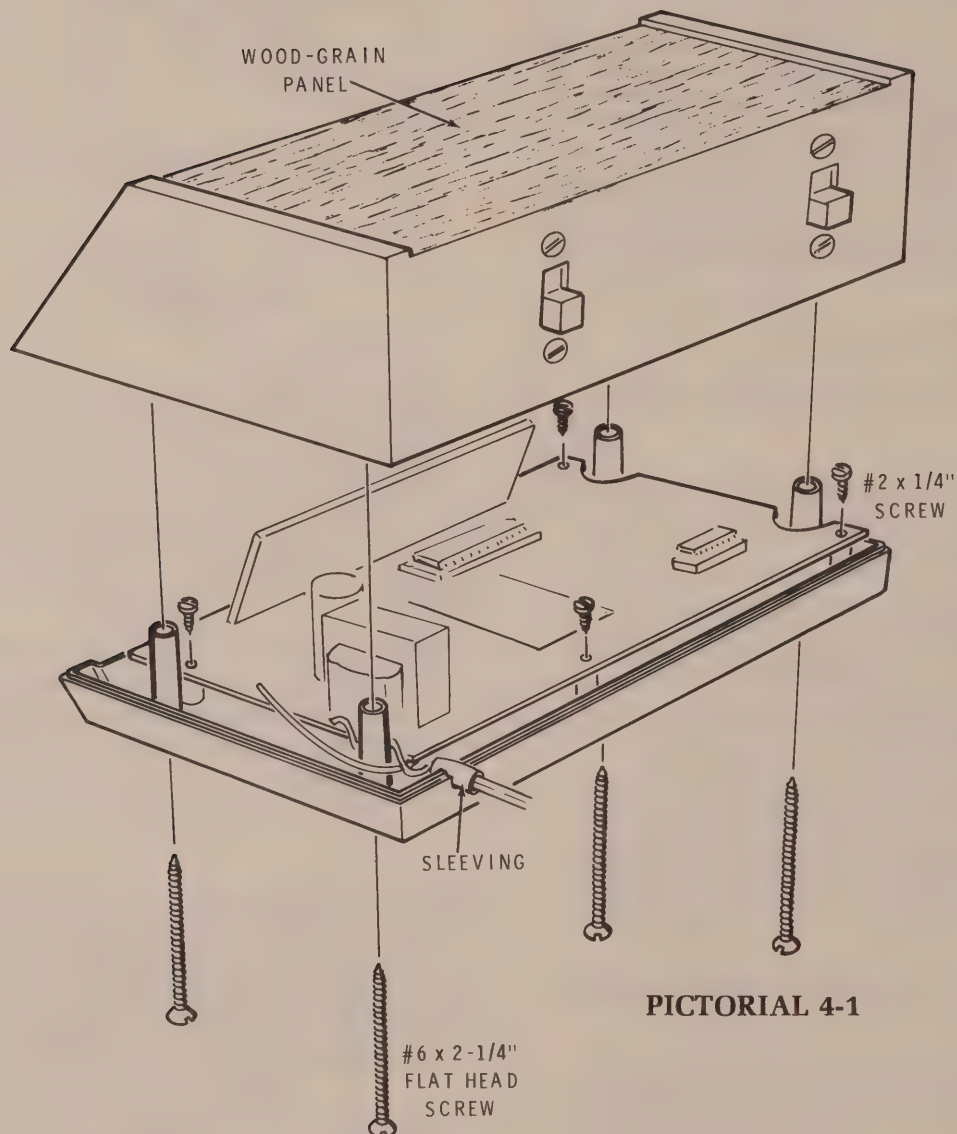


PICTORIAL 3-3

- () Push the SLOW switch. Note that the cycling rate of the Clock is very slow as compared to the previous cycling rate. Continue to cycle at the slow rate until the time indicated is approximately ten minutes **later** than originally set with the TIME switch. Release the SLOW switch.
- () Note the time indicated on the Clock readout. Then push the TIME-ALARM switch to the TIME position. Be sure the time indication is **earlier** than the alarm time set with the SLOW switch above.
- () On the cabinet rear panel, push the ALARM switch upward. Wait a few minutes until the time comes up to the alarm time you set with the TIME-ALARM switch and the SLOW switch. You should now hear a loud sound from the Clock speaker.
- () Operate the SNOOZE switch momentarily; the alarm should stop.
- () Wait approximately nine minutes longer and the alarm should sound again.
- () Push the rear panel ALARM switch down.
- () Remove the line cord from the AC outlet.

This completes the "Initial Tests" of your Clock. Proceed to "Final Assembly."

FINAL ASSEMBLY



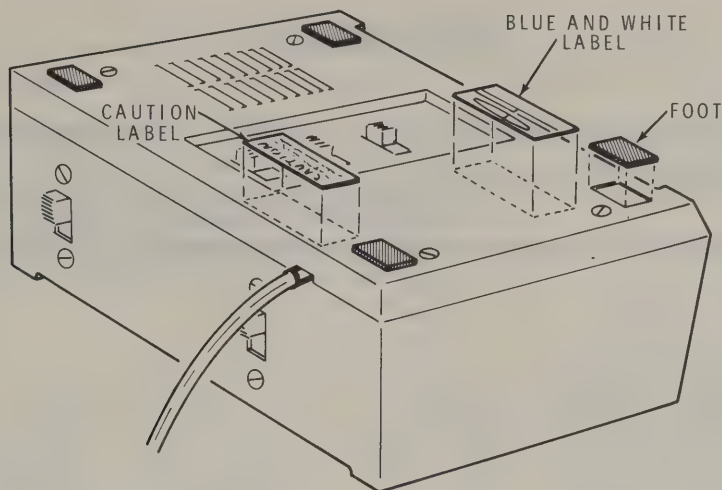
PICTORIAL 4-1

Refer to Pictorial 4-1 for the following steps.

- () Position the circuit board into the cabinet bottom as shown. Then secure the board to the cabinet studs with four #2 \times 1/4" screws. Do not overtighten the screws and strip out the screw holes.

- () Place the sleeving on the line cord down into the notch on the rear edge of the cabinet. Position the cabinet top down onto the bottom half as shown and secure the two halves together with four #6 \times 2-1/4" flat head screws.

NOTE: In the following step, as you install the wood-grain panel on the top of the cabinet top, perform the operation carefully and slowly. Once the wood-grain panel is in place it is very difficult to lift and reposition the panel.



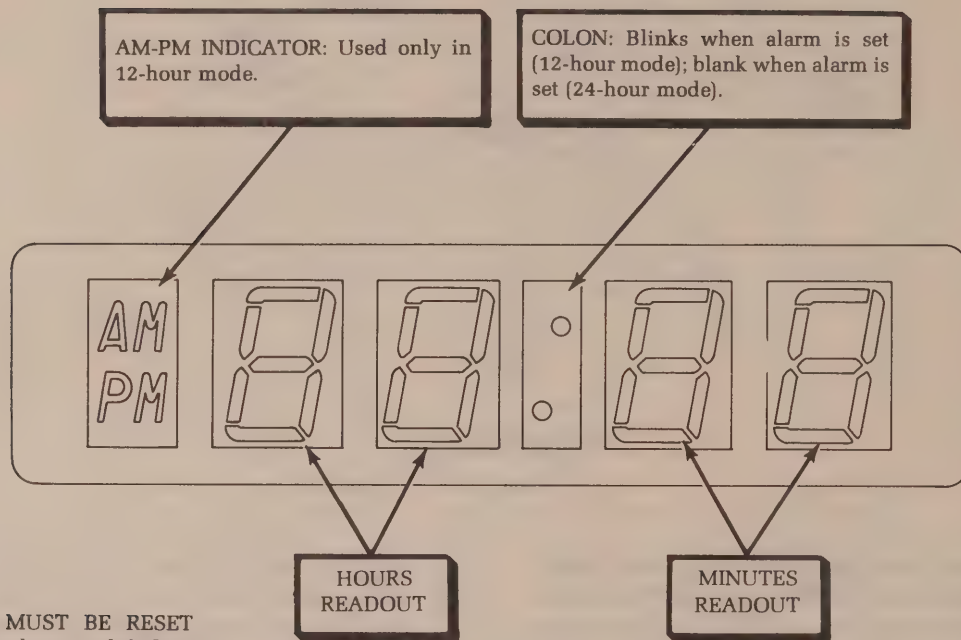
PICTORIAL 4-2

- () Peel the wood-grain panel from its paper backing. Position the panel along the front edge of the clock, squarely in the center of the depressed area. Carefully smooth the panel, from the front toward the rear, until it is in place. NOTE: If any air bubbles should occur, lift the nearest corner slightly and work the bubble toward that corner with your fingertip until the panel is smooth.
- () With a soft cloth, smooth the wood-grain panel firmly down onto the cabinet top.
- () Peel the backing from the blue and white label and press the label in place on the cabinet bottom in the area shown. NOTE: Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.
- () Remove the paper backing from one of the feet. Press the foot in place in the rectangular area near one corner of the cabinet bottom.
- () In the same manner, install the other three feet near the remaining corners of the cabinet as shown.
- () Peel the backing from the "Caution" label and press the label in place as shown.

Refer to Pictorial 4-2 for the following steps.

This completes the "Final Assembly" of your Digital Alarm Clock.

OPERATION

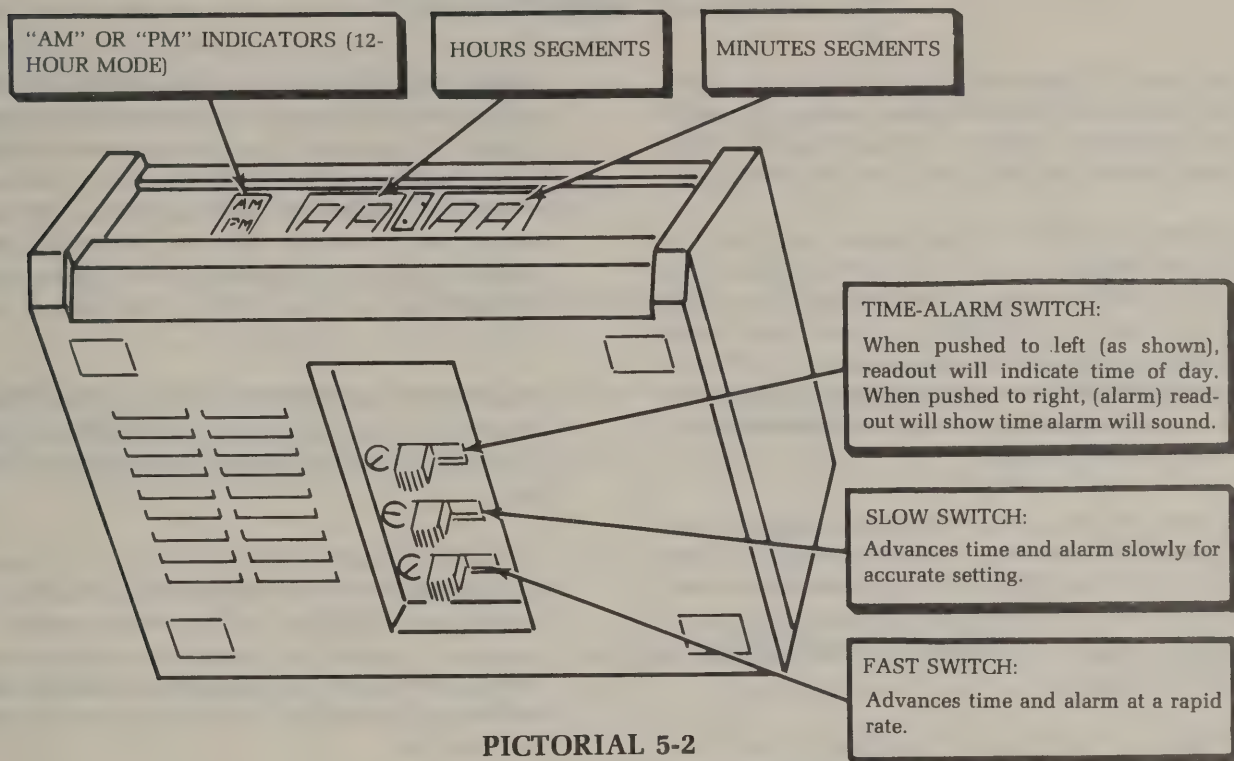


NOTE: CLOCK MUST BE RESET when AM-PM (12-hour) or left digit blinks; this indicates power has been interrupted.

PICTORIAL 5-1

Refer to Pictorials 5-1, 5-2 (above), and 5-3 (Illustration Booklet, Page 2) which illustrate the readout and switches as described in the following text.

1. **ALARM ON-OFF SWITCH:** Turns the alarm on and off; up is On. NOTE: After the alarm sounds, if you wish, you may turn the alarm off and immediately return the switch to the On position; the alarm will sound after another 24 hours.
2. **SNOOZE ALARM SWITCH:** Resets the alarm to go off approximately nine minutes later.
3. **FAST SET-AHEAD SWITCH:** Advances the display sixty minutes each second.
4. **SLOW SET-AHEAD SWITCH:** Advances the display one minute each half second.
5. **TIME-ALARM SWITCH:** Allows you to set the alarm using the FAST and SLOW-SET-AHEAD switches. Also allows the display to indicate the time for which the alarm is set. (Time continues to be kept even though it is not displayed when this switch is used in the ALARM position). Return the switch to TIME after you set the alarm; the Clock display will return to the correct time display.
6. **AM-PM INDICATOR:** Indicates 12-hour segment of the day, either "AM" or "PM", when the Clock is wired for 12-hour operation. Also active when you set the alarm.
7. **HOURS AND MINUTES READOUT:** Indicated the time of day or the time the alarm is set for, depending on the setting of the TIME-ALARM switch.



8. **COLON:** A steady colon indicates that the alarm is Off. In the 12-hour mode, a flashing colon indicates that the alarm is set to On. In the 24-hour mode, the colon will be blank when the alarm switch is On.

TO SET THE TIME

1. Push the FAST SET-AHEAD and SLOW SET-AHEAD switches as necessary to advance the display to the desired time. Be sure the AM or PM indicator is as desired. The AM-PM indicator is inactive in the 24-hour mode of operation.

TO SET THE ALARM

1. Push the TIME-ALARM switch to the ALARM position. The clock will continue to keep the correct time even though the alarm display is stationary.

2. Push the FAST SET-AHEAD and SLOW SET-AHEAD switches as necessary to advance the display to a desired alarm time. Be sure the AM-PM indicator appears as desired. The AM-PM indicator is inactive in the 24-hour mode of operation.
3. Push the TIME-ALARM switch to the TIME position.
4. Set the alarm. Push up the ALARM ON-OFF switch. Observe that the colon will blink on and off (12-hour mode) or blank out (24-hour mode).

IN CASE OF DIFFICULTY

This section of the Manual is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your Clock is assembled.

The second part, titled "Troubleshooting Chart", is provided to assist you in servicing the Clock if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after your Clock has been in use for some time. The "Troubleshooting Chart" lists a number of possible difficulties that could arise along with several possible solutions to those difficulties.

Try to analyze the symptoms of any problem you might have before starting any troubleshooting procedure. You can usually do this by trying the various functions of your Clock to determine abnormal operations. A review of the "Operation" section may help your analysis.

NOTE: Refer to the "Circuit Board X-Ray Views" on Page 30 for the physical location of parts on the circuit board.

GENERAL TROUBLESHOOTING INFORMATION

1. Check all the wires that are connected between the circuit board and other parts. Trace each wire in colored pencil on the Pictorial as you check it. Make sure these wires are connected to the proper points and are properly soldered. Someone not familiar with the unit may notice something you have consistently overlooked.
2. Be sure the IC's are seated properly in their sockets.
3. About 90% of the kits that are returned for repair do not function properly because of poor connections and soldering. Therefore, many troubles can be located by a careful inspection of connections to make sure they are soldered as described in the "Soldering" section of the "Kit Builders Guide." Reheat any doubtful connections.

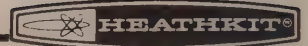
4. Closely examine each circuit board foil in a good light to see that no solder bridges exist between adjacent connections. If available, a magnifying glass would be helpful for this purpose. Remove any solder bridges by holding a clean, hot soldering iron tip between the two points that are bridged until the excess solder flows down onto the tip. Compare your foil pattern against the "X-Ray Views" on Page 30.
5. Be sure each transistor is in its proper location. Be sure that each transistor lead is in the right hole and has a good solder connection to the foil.
6. Check the integrated circuits for proper positioning. (Be sure the dot or notched end of the IC is over the dot printed on the circuit board).
7. Check each electrolytic capacitor to be sure the lead near the positive (+) marking is at the correct position.
8. Check each resistor value carefully. If would be easy, for example, to install a 4700 Ω (yellow-violet-red) resistor where a 47 k Ω (yellow-violet-orange) resistor is called for. A resistor that is discolored, or cracked, or shows any sign of bulging would indicate that it is damaged and should be replaced. Since damaged resistors are often the result of some other difficulty (such as faulty wiring), you should try to find out what caused the damage before you replace the part.
9. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.
10. Check all component leads connected to the circuit boards. Make sure the leads do not extend through the circuit board and come in contact with other connections or parts.

If you still cannot locate and correct the trouble after the above tests are completed, and if a voltmeter is available, check your Clock's voltages against the voltages shown on the Schematic Diagram (fold-in).

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information at the rear of the Manual. Your Warranty is also located inside the rear of the Manual.

Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE
1. Incorrect readout segments lit.	<ol style="list-style-type: none"> Poor solder connections or solder bridges. Integrated circuit IC1. Display tube. Incorrect jumper wires installed.
2. Time does not advance.	<ol style="list-style-type: none"> Time-Alarm switch incorrectly set at Alarm position. Resistor R4. Integrated circuit IC1.
3. Readout display does not light, or is very dim even under bright room lighting.	<ol style="list-style-type: none"> Diodes D1 or ZD2. Transistor Q1. Light dependent resistor LDR1. Resistors R2, R3, or R5.
4. Clock gains time.	<ol style="list-style-type: none"> 50 Hz jumper (AB-AC) installed and you have 60 Hz service.
5. Alarm does not work properly.	<ol style="list-style-type: none"> Transistor Q2. Diode D3. Integrated circuit IC2. Switches SW1 or SW2. Speaker.
6. Readout display does not dim.	<ol style="list-style-type: none"> Light dependent resistor LDR1. Transistor Q1.
7. Alarm-On indicator (colon) does not function properly.	<ol style="list-style-type: none"> Alarm switch SW1.
8. Speaker buzzes.	<ol style="list-style-type: none"> Wire or lead ends in speaker cone.



SPECIFICATIONS

Display	Four full-fluorescent digits, AM and PM indicators, and colon.
Format	12 or 24 hour.
Accuracy	As determined by line frequency.
Snooze Alarm	Recycles at nine-minute intervals.
Power Requirement	3.5 watts, 120 or 240 VAC, 50 or 60 Hz.
Dimensions	7" wide × 5" deep × 2-1/2" high (16.8 × 12 × 6cm).
Weight	1-3/4 lbs. (.79 kg).

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

CIRCUIT DESCRIPTION

Refer to the fold-in Schematic Diagram and Schematic Notes as you read the following Circuit Description.

All the digital logic for the Clock is performed inside integrated circuit IC1. The remaining external circuits provide DC power, dimming control, and an alarm oscillator.

Diode D1, capacitor C1, resistor R1, and zener diode ZD2 form a DC supply for IC1 and the display tube. This voltage is also used by the switch circuits of SW1 through SW5 and it provides control signals to IC1. Time regulation is derived from the line frequency and is applied as an AC signal through resistor R4 to IC1.

The segment anodes of the fluorescent display tube are driven directly by the display drivers within IC1. The display filament is heated by an AC voltage applied through resistor R5 to display tube pin 1. A DC grid bias voltage, controlled by a dimming circuit, is applied to display tube pin 18.

Resistors R2 and R3, with light-dependent resistor LDR1 and transistor Q1 form a dimming circuit. As the intensity of the surrounding room light increases

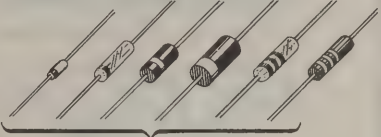
or decreases, the internal resistance of LDR1 varies accordingly. When the room lighting is bright, the resistance of LDR1 decreases to permit a higher forward bias on the base of transistor Q1. This causes more current to flow in Q1 and the emitter voltage goes up. Since the emitter of Q1 is connected directly to pin 18 of the display tube, a greater voltage causes the tube to conduct harder to create a brighter display. The opposite is true when the surrounding light is dimmer; the resistance of LDR1 is increased, the emitter voltage of Q1 is lowered, and the grid bias voltage at pin 18 is lowered to cause the display tube to conduct less. This produces a dimmer display for a lowered light intensity outside the Clock.

Diode D3 and capacitor C2 provide a second DC voltage for the alarm circuits. Integrated circuit IC2 and capacitor C3, with resistors R9 and R10, form a square-wave oscillator which is turned on and off by a control signal from pin 25 of integrated circuit IC1. Transistor Q2 is the driver for the speaker.

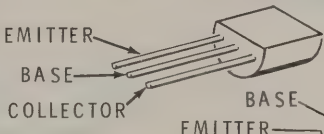
Dual primary transformer T1 can be wired to operate from either 120 or 240-volt AC power sources. Separate secondary windings in T1 provide the voltages needed for the two DC supplies.

SEMICONDUCTOR IDENTIFICATION CHARTS

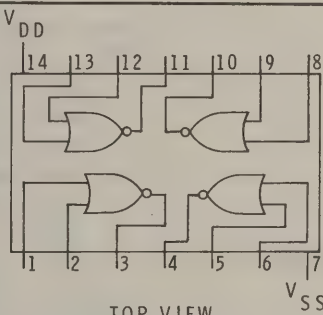
DIODES

COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
D1, D3	57-65	1N4002	<p>IMPORTANT: THE BANDED END OF DIODES CAN BE MARKED IN A NUMBER OF WAYS.</p>  <p>BANDED END</p>
ZD2	56-630	1N4748A	
D4 D5 (optional)	56-56	1N4149	

TRANSISTORS

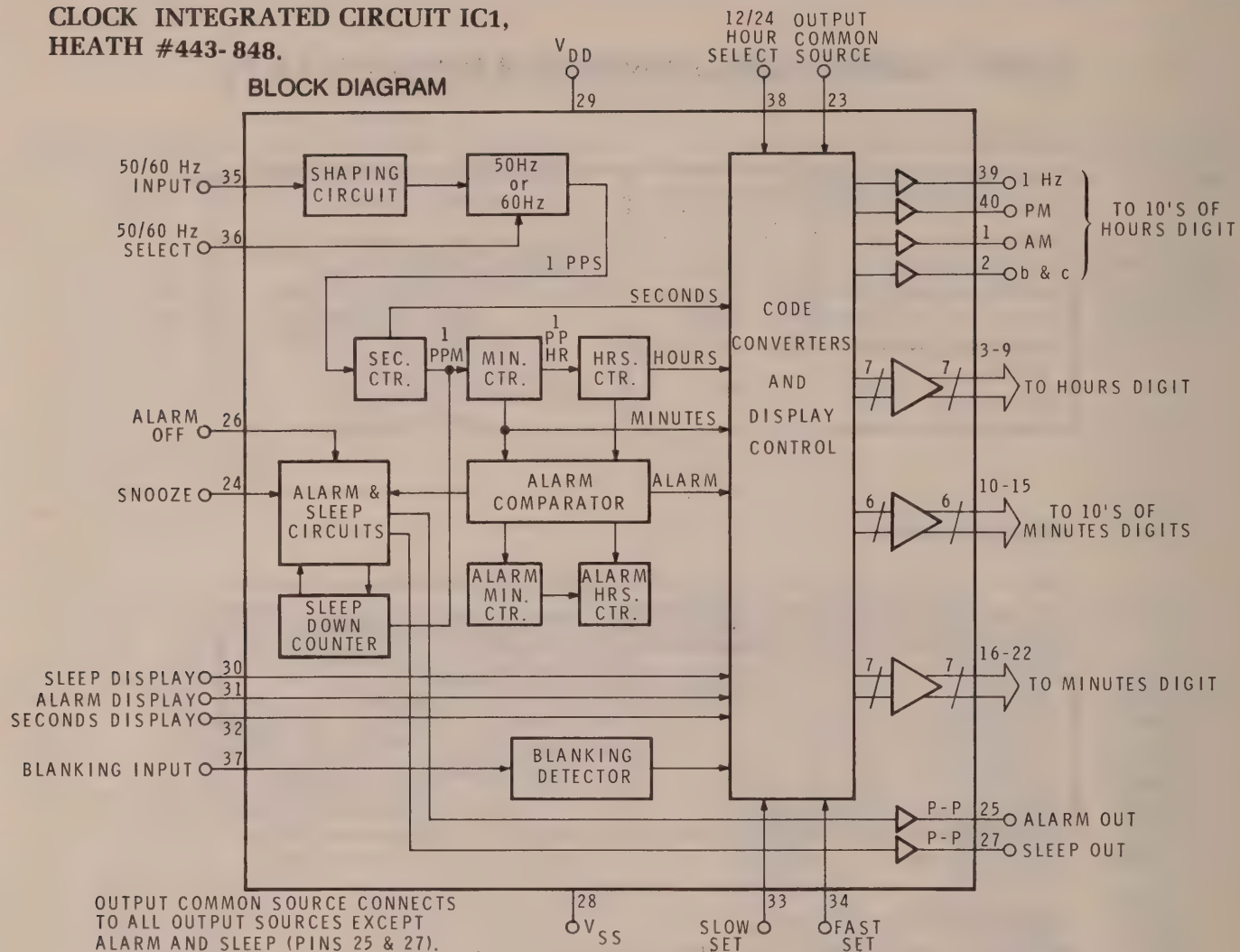
COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
Q1	417-881	MPSA13	
Q2	417-801	MPSA20	

INTEGRATED CIRCUITS

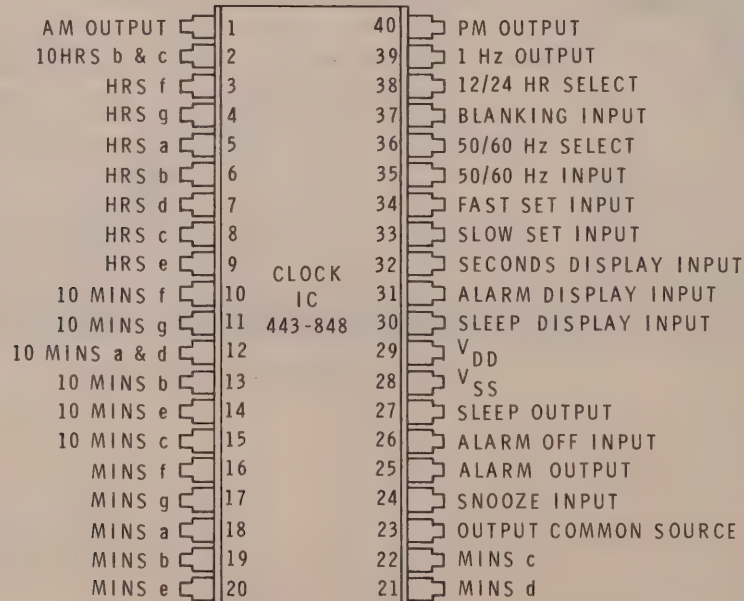
COMPONENT	HEATH PART NUMBER	MANUFACTURER'S NUMBER	IDENTIFICATION
IC2	443-703	CD4001	 <p>TOP VIEW</p>

CLOCK INTEGRATED CIRCUIT IC1, HEATH #443-848.

BLOCK DIAGRAM

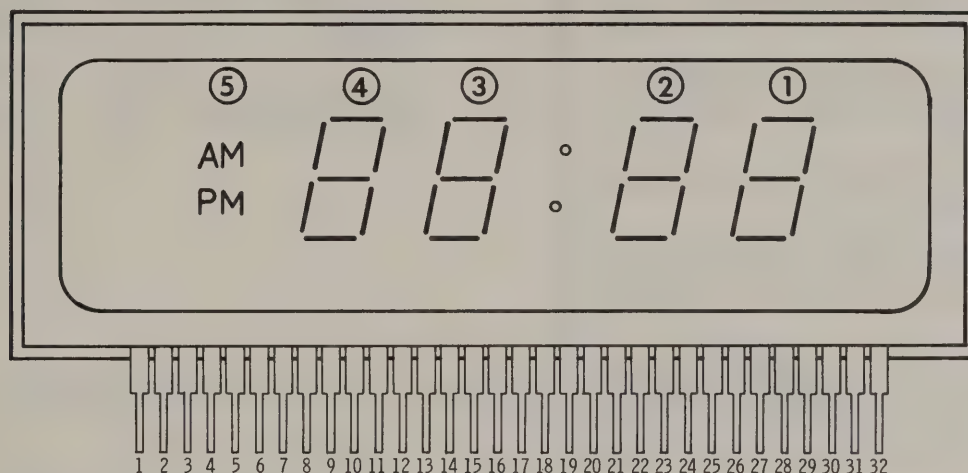


PIN-OUT DIAGRAM



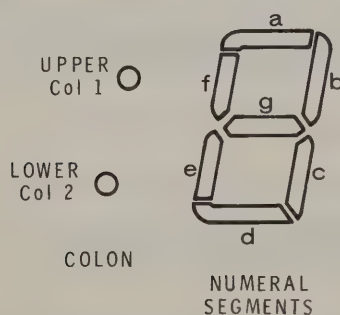
READOUT TUBE

HEATH #411-829, MFR. TYPE 5-LT-02.



PIN CONNECTION (from Left to Right facing display).

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
CONNECTION	F	Col ₁	Col ₂	PM	AM	f ₄	g ₄	a ₄	c ₄	b ₄	f ₄	g ₃	a ₃	b ₃	d ₃	c ₃	e ₃	G	f ₂	g ₂	a ₂	b ₂	e ₂	c ₂	f ₁	g ₁	a ₁	b ₁	e ₁	c ₁	d ₁	F



Key: Count DIGIT from right to left. (AM-PM is the fifth digit).

a₃ = "a" segment of third digit.

G = GRID connections.

F = FILAMENT.

YOUR HEATHKIT 90-DAY LIMITED WARRANTY

For a period of ninety (90) days after purchase, Heath Company will replace or repair free of charge any parts that are defective either in materials or workmanship. You can obtain parts directly from Heath Company by writing us at the address below or by telephoning us at (616) 982-3571. And we'll pay shipping charges to get those parts to you — anywhere in the world.

We warrant that during the first ninety (90) days after purchase, our products, when correctly assembled, calibrated, adjusted and used in accordance with our printed instructions, will meet published specifications.

If a defective part or error in design has caused your Heathkit product to malfunction during the warranty period through no fault of yours, we will service it free upon proof of purchase and delivery at your expense to the Heath factory, any Heathkit Electronic Center or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by: incorrect assembly, the use of corrosive solder, defective tools, misuse, or fire; or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for inconvenience, loss of use, customer assembly or set-up time.

This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. **We are not responsible for accidental or consequential damages.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

If you are not satisfied with our service (warranty or otherwise) or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

HEATH COMPANY
BENTON HARBOR, MI. 49022

Prices and specifications subject to change without notice.

HEATH COMPANY PHONE DIRECTORY

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Amateur Radio (616) 982-3296
Test Equipment, Weather Instruments and
Home Clocks (616) 982-3315
Television (616) 982-3307
Aircraft, Marine, Security, Scanners, Automotive,
Appliances and General Products (616) 982-3496
Computers (616) 982-3309

CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

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TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. You'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

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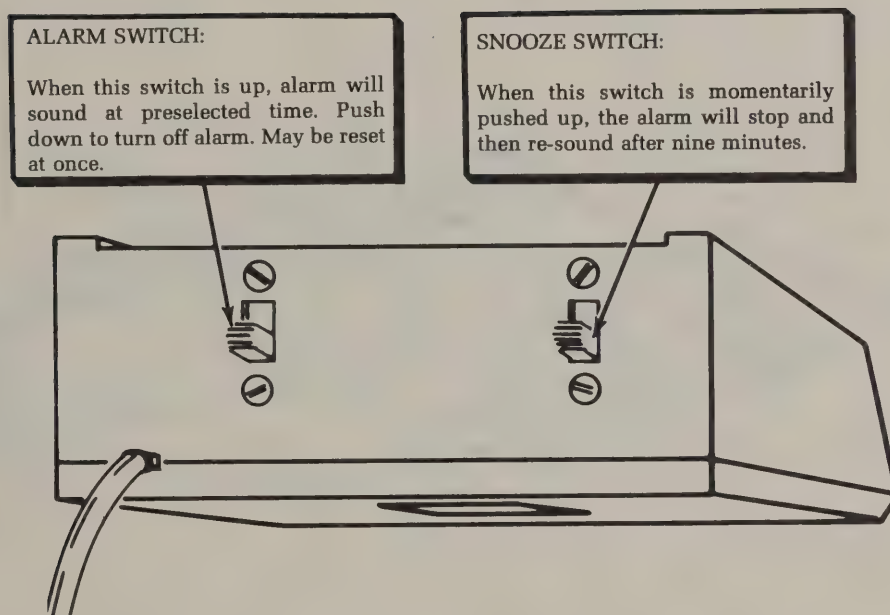
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Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least **THREE INCHES** of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

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PICTORIAL 5-3

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Heath Company
Service Department
Benton Harbor, Michigan 49022

SCHEMATIC OF THE HEATHKIT® DIGITAL ALARM CLOCK MODEL GC-1107

NOTES:

1. RESISTOR VALUES ARE IN OHMS (K = 1000, M = 1,000,000).
2. ALL RESISTORS ARE 1/4 WATT, 5% TOLERANCE UNLESS OTHERWISE NOTED.
3. ALL CAPACITOR VALUES ARE IN μ F (MICROFARADS).
4.  THIS SYMBOL INDICATES A CIRCUIT BOARD GROUND.
5.  THIS SYMBOL INDICATES A CIRCUIT BOARD WIRE CONNECTION.
6.  THIS SYMBOL INDICATES A CONNECTION USED IN THE 12-HOUR MODE OF OPERATION.
7.  THIS SYMBOL INDICATES A CONNECTION USED IN THE 24-HOUR MODE OF OPERATION.
8.  THIS SYMBOL INDICATES A DC VOLTAGE MEASURED WITH A HIGH INPUT IMPEDANCE VOLTMETER FROM THE POINT INDICATED TO CIRCUIT BOARD GROUND. VOLTAGES MAY VARY $\pm 10\%$. VOLTAGES IN THE DIMMING CIRCUIT OF TRANSISTOR Q1 DEPEND ON THE AMOUNT OF LIGHT DETECTED BY LD1. *ALARM OFF.
9. DIODES D4 AND D5 ARE USED ONLY IN THE 24-HOUR MODE OF OPERATION.

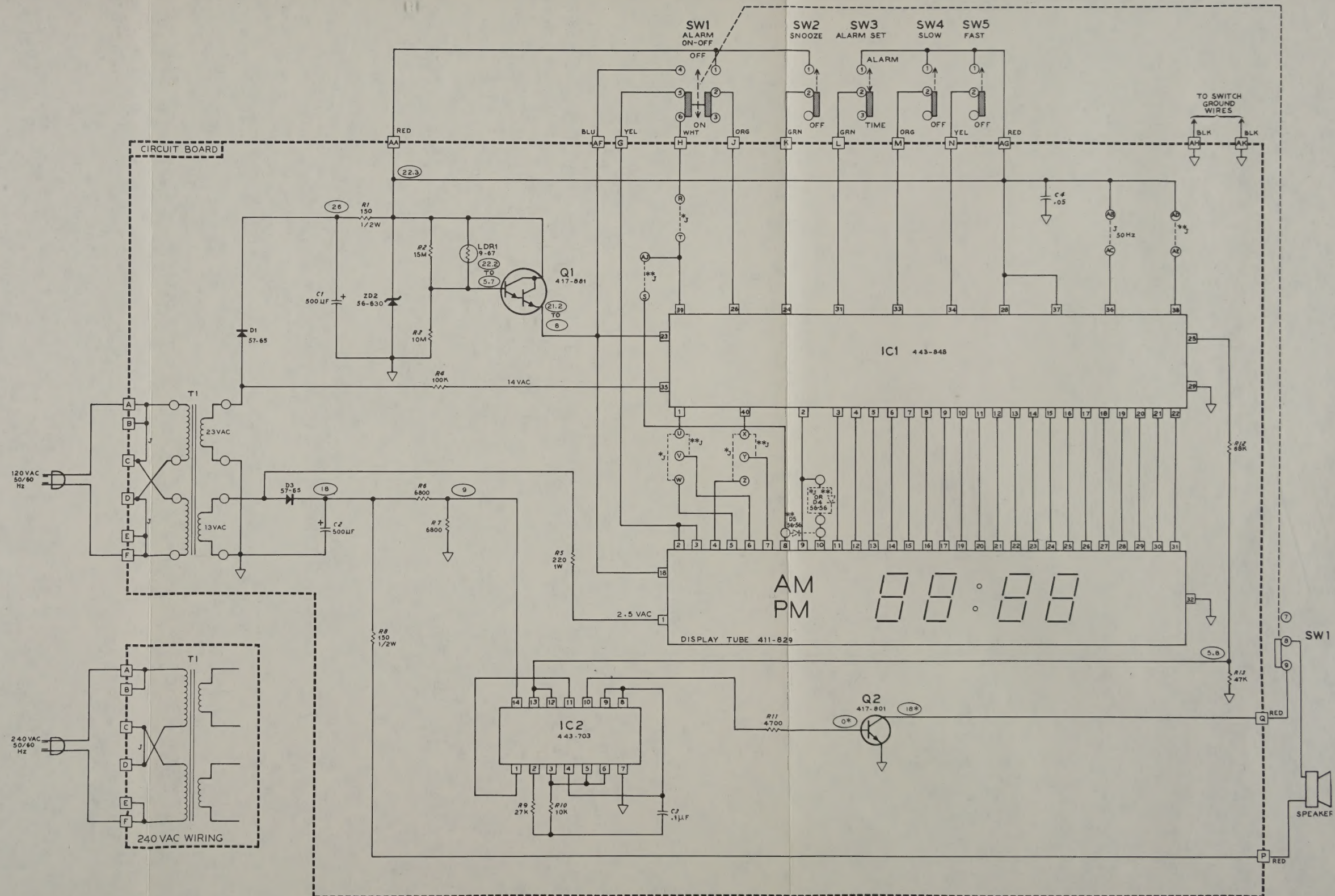
120 VAC
50/60
Hz

240 VAC
50/60
Hz

SCHEMATIC OF THE
HEATHKIT®
DIGITAL ALARM CLOCK
MODEL GC-1107

NOTES:

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9. DIODES D4 AND D5 ARE USED ONLY IN THE 24-HOUR MODE OF OPERATION.



An Improved Display for the TR-7400A

— very sensible

Simple, fast, effective!

The Kenwood TR-7400A 2 meter FM transceiver is a fine radio, but it can be improved, operationally speaking, by a simple modification.

This modification:

1. Eliminates out-of-band operation forever;
2. Provides instant monitoring of a repeater input frequency;
3. Costs nothing, requires no parts, and is easily restored.

To proceed, disconnect the power to the radio and remove the bottom cover. Looking at the large receiver board from the front, locate wire-wrap pin "TS"

at the left front edge of the board near the relay. Remove the wire end from the pin by unwrapping. Now locate wire-wrap pin "RS" located at the right front of the board somewhat in from the right edge. Remove the wire from the pin by unwrapping. Slip this wire back through the cabling until it will reach pin "TS". Trim off excess bare wire and solder to pin "TS". Finally, splice about three inches of insulated wire to the remaining wire and solder to the "RS" pin.

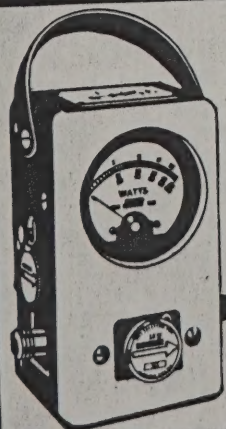
Voilà! The "TX OFFSET" switch now becomes an "RX OFFSET" switch. The

radio will now transmit only the frequency displayed on the LED readout (and the selector switches). No more accidental out-of-band transmitting when operating above 147.400 MHz! The "RX OFFSET" switch now affects only the receiver frequency and provides the +600 and -600 kilohertz offset function as marked. When working through a repeater, the operator may instantly check the input frequency by flipping the switch to "SIMPLEX" to see if the station being worked can be heard directly, indicating that a move to a

simplex frequency would be in order. Simplex operation is the same as before modification.

As a final touch, a white decal letter "R" may be applied in place over the "T" above the offset switch and the caption "TRANSMITTER FREQUENCY" can be applied above the LED readout. Shouldn't all transceivers operate this way?

Credits to the Anaheim (CA) Amateur Radio Club and WB6ZFU for providing the information on the "RS" and "TS" functions. ■



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